2022.sgiw.org

Society of Gastrointestinal Intervention

SGI 2022

The 15th Annual Meeting of Society of Gastrointestinal Intervention

Beyond the COVID-19 Pandemic,
Enjoy the Collaboration and Innovation in GI Intervention!

14 Fri **-15** Sat, October
Grand Hyatt Incheon, Korea

The Society of Gastrointestinal Intervention

Society of Gastrointestinal Intervention

SGI 2022

The 15th Annual Meeting of Society of Gastrointestinal Intervention

Beyond the COVID-19 Pandemic,
Enjoy the Collaboration and Innovation in GI Intervention!

PROGRAM & ABSTRACT BOOK

SGI *The Society of Gastrointestinal Intervention*

CONTENTS

WELCOME MESSAGE

Dear Fellow Academic Members,

On behalf of the Society of Gastrointestinal Intervention (SGI), it is a great honor and pleasure to invite you to “The 15th Annual Meeting of Society of Gastrointestinal Intervention (SGI 2022)” which will be held in Incheon, Korea on October 14 and 15, 2022.

Our society is a unique multidisciplinary society founded to encourage and facilitate the clinical and scientific collaborations between radiologists, surgeons and gastroenterologists. The goal of our society is to build a comprehensive GI intervention network among endoscopists, interventional radiologists and gastrointestinal surgeons to provide a platform for multidisciplinary collaboration. We hope to provide a network where experts can advance, inform, share, and globalize technological innovations of each specialty. The society aims to support and educate young brilliant doctors in the early stages of their career as a specialist and guide their ways into the global stage. Final and foremost, our will set an example showcasing the benefits of multi-disciplinary collaboration in science, education and clinical practice. To achieve these goals, we hold an International Academic Conference once a year, and publish quarterly an academic journal titled the ‘International Journal of Gastrointestinal Intervention (IJGII)’.

Since the 1st conference held in 2007, the society has been holding an academic conference once a year. In 2018, the 12th conference was held, for the first time outside of South Korea, in Nanjing, China. After the successful meeting in China, we have decided to alternate the host country between Korea and other countries. The 14th academic conference was scheduled to be held in Hyderabad, India in 2020. Unfortunately, the conference was canceled due to the COVID-19 pandemic and was substituted with a small group meeting in Korea. And we look forward to hosting SGI abroad again soon.

The theme of this year conference is “Beyond the COVID-19 Pandemic, Enjoy the Collaboration and Innovation in GI Intervention!”, and we invite internationally renowned scholars to assist you in your research and patient care. We believe this symposium will be a great platform to connect colleagues together and the valuable time to share and discuss various ideas and issues on digestive disease to leap forward human care from health care.

We look forward for to your active participation.
Thank you.

Young Deok Cho
President

Hwoon-Yong Jung
Secretary General

Sangjoon Park
Vice Secretary General

SGI 2022 Committees

Executive Committee			
President	Young Deok Cho	Soon Chun Hyang University	Korea
Secretary General	Hwoon-Yong Jung	University of Ulsan	Korea
Vice Secretary General	Sangjoon Park	Catholic Kwandong University	Korea
Tresurer	Hwan Hun Chung	Korea University	Korea

Steering Committee			
Members	Todd H. Baron	University of North Carolina	USA
	Kenneth F. Binmoeller	California Pacific Medical Center	USA
	Mariano E. Giménez	University of Buenos Aires	Argentina
	Ziv J. Haskal	University of Virginia	USA
	Sung-Gwon Kang	S&G Biotech Inc.	Korea
	Jin Hong Kim	Ajou University	Korea
	Yun Hwan Kim	Presbyterian Medical Center	Korea
	Richard A. Kozarek	Virginia Mason Medical Center	USA
	Hans-Ulrich Laasch	The Christie, Manchester	UK
	DongKi Lee	Yonsei University	Korea
	Jeffrey H. Lee	MD Anderson Cancer Center	USA
	D. Nageshwar Reddy	Asian Institute of Gastroenterology & AIG Hospitals	India
	Dong Wan Seo	University of Ulsan	Korea
	Peter D. Siersema	Radboud University Medical Center	The Netherlands
	Ho-Young Song	University of Ulsan	Korea
	Gao-Jun Teng	Zhongda Hospital, Southeast University	China
	Hyun-Ki Yoon	University of Ulsan	Korea

SGI 2022 Organizing Committee

Scientific Program Committee			
Chair	Hans-Ulrich Laasch	The Christie, Manchester	UK
Co-chairs	Kenneth F. Binmoeller	California Pacific Medical Center	USA
	Sang Hyub Lee	Seoul National University	Korea
	Ji Hoon Shin	University of Ulsan	Korea
Members	Ji Yong Ahn	University of Ulsan	Korea
	In Rae Cho	Seoul Nationla University	Korea
	Jin Woo Choi	Seoul Nationla University	Korea
	Kwang Hyun Chung	Eulji University	Korea
	Hyun Pyo Hong	Sungkyunkwan Univeristy	Korea
	Chae Hoon Kang	Eulji University	Korea
	Hyoun Woo Kang	Seoul Nationla University	Korea
	Ung Rae Kang	Daegu Catholic University	Korea
	Kun Yung Kim	Jeonbuk National University	Korea
	Byung Chan Lee	Chonnam National University	Korea
	Hyuk Lee	Sungkyunkwan Univeristy	Korea
	Soo-Young Na	The Catholic University of Korea	Korea
	Se Woo Park	Hallym University	Korea
	Suyoung Park	Gachon University	Korea
	Tae Jun Song	University of Ulsan	Korea
	Chang Jin Yoon	Seoul Nationla University	Korea

Liaison Committee			
Chair	Jong Ho Moon	Soon Chun Hyang University	Korea
Members	Tiing Leong Ang	Changi General Hospital	Singapore
	Yasuaki Arai	National Cancer Center	Japan
	Mariano E. Giménez	University of Buenos Aires	Argentina
	Bing Hu	Second Military Medical University	China
	Hiroyuki Isayama	Juntendo University	Japan
	Arthur Kaffes	Royal Prince Alfred Hospital	Australia
	James Y. Lau	The Chinese University of Hong Kong	Hong Kong
	DongKi Lee	Yonsei University	Korea
	Jeffrey H. Lee	MD Anderson Cancer Center	USA
	Lydia Theresia Purba	National Cardiovascular Center, Harapan Kita	Indonesia
	D. Nageshwar Reddy	Asian Institute of Gastroenterology	India
	Rungsun Rerknimitr	Chulalongkorn University	Thailand
	Hany Shehab	Cairo University	Egypt
	Hyung Jin Shim	Chung-Ang Univeristy	Korea
	Hsiu-Po Wang	National Taiwan University	Taiwan
	Ren-jie Yang	Peking University	China

Audit			
Co-chairs	Seok Ho Dong	Kyung Hee University	Korea
	Sang Uk Han	Ajou University	Korea

Meeting & Exhibition Committee			
Co-chairs	Okan Akhan	Hacettepe University	Turkey
	Sung Bum Cho	Korea University	Korea
	Hong Shan	Sun Yat-sen University	China
	Kenjiro Yasuda	Kyoto Second Red Cross Hospital	Japan

Publicity Committee			
Co-chairs	Hans-Ulrich Laasch	The Christie, Manchester	UK
	Jeffrey H. Lee	MD Anderson Cancer Center	USA
	Deok Ho Nam	SAM Hospital	Korea

Data Processing Committee			
Chair	Hyun Gun Kim	Soon Chun Hyang University	Korea

Editorial Committee			
Co-Editors-in-chief	Todd H. Baron	University of North Carolina	USA
	Ziv J. Haskal	University of Virginia	USA
Deputy Editors	Hong Joo Kim	Sungkyunkwan University	Korea
	Yoon Ho Jung	Soon Chun Hyang University	Korea
	Hyun-Ki Yoon	University of Ulsan	Korea
Associate Editors	Kyung J. Cho	University of Michigan	USA
	Seung Kwon Kim	Washington University	USA
	Hans-Ulrich Laasch	The Christie NHS Foundation Trust	UK
	Jeffrey H. Lee	MD Anderson Cancer Center	USA
	Katherine A. Morgan	Medical University of South Carolina	USA
	Peter D. Siersema	Radboud University Medical Center	The Netherlands

SGI 2022 Committees

Editorial Committee			
Members	Oscar A. Alvarez	South Texas Gastroenterology Associates	USA
	Jennifer Chennat	University of Pittsburgh Medical Center	USA
	Sung Ki Cho	Sungkyunkwan University	Korea
	Wojciech Cwikiel	University of Michigan Hospital	USA
	Mariano E. Giménez	University of Buenos Aires	Argentina
	Ho Seong Han	Seoul National University	Korea
	Shayan Irani	Virginia Mason Medical Center	USA
	Hiroyuki Isayama	Juntendo University	Japan
	Sung Ill Jang	Yonsei University	Korea
	Krishna Kandarpa	Weill-Cornell School of Medicine	USA
	Clive Kay	Bradlord Teaching Hospitals	USA
	Jin Hong Kim	Ajou University	Korea
	Jin Hyoung Kim	University of Ulsan	Korea
	Yeon Ji Kim	The Catholic University of Korea	Korea
	Lyo Min Kwon	Hallym University	Korea
	Jun Kyu Lee	Dongguk University	Korea
	Yoon Suk Lee	Inje Unviversity	Korea
	Sun Gyo Lim	Ajou University	Korea
	Andrew Lowe	Bradford Teaching Hospitals	UK
	John Maple	University of Oklahoma Health Sciences Center	USA
	Derrick Martin	South Mancester University	UK
	Alexander Meining	II. Medizinische Klinik Und Polikinik	Germany
	Jae Jun Park	Yonsei University	Korea
	Yehyun Park	Yonsei University	Korea
	M. Perez-Miranda	Hospital Universitario Rio Hortega	Spain
	Sundeep J. Punamiya	Asian Institute of Gastroenterology	India
	Paulo Sakai	University of San Paulo	Brazil
	Ji Hoon Shin	University of Ulsan	Korea
	Takeshi Urade	Kobe University Graduate School of Medicine	Japan
	Field Willingham	Emory University Hospital	USA
	Koichiro Yamakado	Hyogo College of Medicine	Japan
	Zheng Qiang Yang	Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College	China
	Fan Yong	Haine Hospital	China

Research Ethics Committee			
Chair	Young Deok Cho	Soon Chun Hyang University	Korea
Co-chairs	Seungmin Bang	Yonsei University	Korea
	Dongil Gwon	University of Ulsan	Korea
	Yoonho Jung	Soon Chun Hyang University	Korea
	Hong Joo Kim	Sungkyunkwan University	Korea
	Hyun-Ki Yoon	University of Ulsan	Korea

KEY FEATURES OF SGI

- Multidisciplinary
- Collaboration
- Unique Expertise
- World-Leading Vision

The primary goals of the SGI are to:

1 Maximize Interdisciplinary Collaboration
Establish a comprehensive GI intervention network between endoscopists, interventional radiologists, and GI surgeons for multidisciplinary collaboration and interaction

2 Share Technological Innovation
Inform, promote and globalize outstanding technological innovations of each specialty

3 Maximize Interdisciplinary Collaboration
Aid young brilliant doctors to make an early debut on the international stage through SGI

4 Maximize Interdisciplinary Collaboration
Become a role model as a unique international meeting in the field of GI intervention

International Journal of Gastrointestinal Intervention (IJGII)

As the official journal of the Society of Gastrointestinal Intervention (SGI), *International Journal of Gastrointestinal Intervention (IJGII)* delivers original, peer-reviewed articles for gastroenterologists, interventional radiologists, surgeons, gastrointestinal oncologists, nurses and technicians who need current and reliable information on the interventional treatment of gastrointestinal and hepatopancreaticobiliary diseases. Regular features also include 'state-of-the-art' review articles by leading authorities throughout the world. IJGII will become an international forum for the description and discussion of the various aspects of interventional radiology, endoscopy and minimally invasive surgery.

IJGII (pISSN 2636-0004, eISSN 2636-0012) was published four times a year on the last day of January, April, July, and October, which has effected from January 1 in 2019. This Journal was first published biannually on June and December, beginning in December 2012 under the title 'Gastrointestinal Intervention' (former pISSN 2213-1795, eISSN 2213-1809) and was changed to be published three times a year from 2016. Commencing with the January 2019 issue, the Journal was renamed 'International Journal of Gastrointestinal Intervention'. Its ISO abbreviation is Int J Gastrointest Interv. Free full-texts are available at the homepage (http://www.ijgii.org). The Journal is currently indexed in Scopus, Korea Citation Index (KCI), KoreaMed, ScienceCentral, DOAJ (Directory of Open Access Journals), DOI/Crossref, Google Scholar, and Emerging Sources Citation Index (ESCI).

PROGRAM at a GLANCE

Day 1 October 14 (Friday)

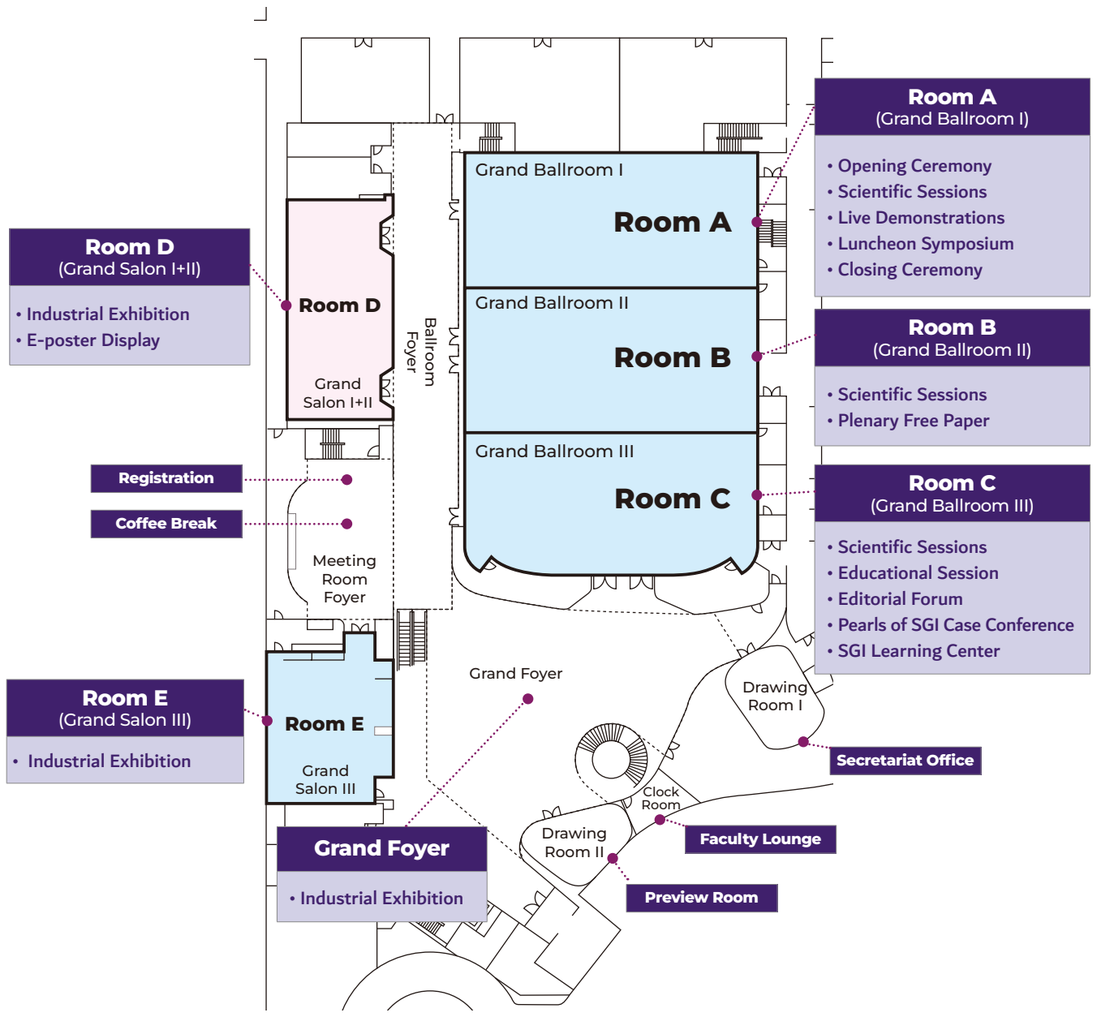
Time	Room A	Room B	Room C
09:00-10:20	**Session 1** Therapeutic modalities of various esophageal diseases	**Session 2** How to cope with ERCP/EUS related complications: Who do you call	**Educational Session**
10:20-10:30	**Opening Ceremony**		
10:30-11:00	Coffee Break		
11:00-12:20	**Live Demonstration 1** (Hyderabad, India)	**Session 3** Role of EUS for diagnosis and treatment of pancreatic cystic neoplasms	**Pearls of SGI Case Conference**
12:20-13:20	**Luncheon**		
13:20-13:30	Break		
13:30-14:50	**Session 4** Malignant obstruction at the level of the distal duodenum: What is the most effective modality?	**Session 5** The 20 most important studies in current management of advanced HCC	**Session 6** Cutting edge of diagnostic and therapeutic approach for Crohn's disease
14:50-15:20	Coffee Break		
15:20-16:40	**Session 7** Management of small bowel tumor	**Session 8** Management of solitary large HCC	**Session 9** Cutting edge of diagnosis and management of obscure GI bleeding
16:40-18:00	**Live Demonstration 2** (Barcelona, Spain)	**Session 10** HCC with bile duct invasion	**Educational Session**
18:00-	**Welcome Reception**		**Venue : The Ballroom (2F, East Tower)**

Day 2 October 15 (Saturday)

Time	Room A	Room B	Room C
08:00-09:20	**Live Demonstration 3** (Seattle, USA)	**Plenary Free Paper**	**Editorial Forum**
09:20-09:50	Coffee Break		
09:50-11:10	**Session 11** Safety and comfort issues of GI intervention	**Session 12** Multidisciplinary approach to gallbladder drainage in surgically high risk patients	**Session 13** Cutting edge of EMR/ESD and NOTES techniques
11:10-12:30	**Session 14** Clinical implications of obesity and sarcopenia	**Session 15** Management of PD stricture	**Session 16** Challenging cases; Short bowel syndrome
12:30-13:30	**Luncheon Symposium** (Korea Otsuka Pharm.)		
13:30-13:40	Break		
13:40-15:00	**Session 17** Multidisciplinary management of gastric cancer related bleeding	**Session 18** How to improve diagnostic yield in indeterminate biliary stricture	**SGI Learning Center**
15:00-15:30	Coffee Break		
15:30-16:50	**Live Demonstration 4** (Seoul, Korea)	**Session 19** Cutting-edge technology for detection and diagnosis of IPNB	
16:50-17:00	**Closing & Awards Ceremony**		

FLOOR PLAN

West Tower (B1)



CONFERENCE INFORMATION

Title	The 15th Annual Meeting of Society of Gastrointestinal Intervention
Dates	October 14 (Fri) – October 15 (Sat), 2022
Venue	Grand Hyatt Incheon, Korea
Conference Type	Hybrid
Conference Theme	Beyond the COVID-19 Pandemic, Enjoy the Collaboration and Innovation in GI Intervention!
Website	2022.sgiw.org
Official Language	English
Organized by	The Society of Gastrointestinal Intervention Tel: +82-2-473-0089 E-mail: sgisci@sgiw.org
Secretariat	Convention PM Tel: +82-31-903-4385 (Registration: +82-31-906-4388) E-mail: sgi@conventionpm.com [During the conference: Drawing Room I]

Registration

Date	Time	Location
October 14 (Fri)	08:00-17:00	Meeting Room Foyer (B1)
October 15 (Sat)	07:30-16:00	

▹ **Name Badge** For security purposes, participants and exhibitors are required to wear their name badges during the conference

▹ **Certificate of Attendance** Certificate of Attendance and Registration Receipt:
Please download it at the conference website after the conference.

Opening Ceremony

Date	Time	Place
October 14 (Fri)	10:20 - 10:30	Grand Ballroom I (Room A)

Welcome Reception

Date	Time	Place
October 14 (Fri)	18:00-	The Ballroom (2F, East Tower)

Luncheon Symposium

Date	Time	Place	Company
October 15 (Sat)	12:30-13:20	Grand Ballroom I (Room A)	Otsuka

Closing Ceremony

Date	Time	Place
October 15 (Sat)	16:50-	Grand Ballroom I (Room A)

SGI Edelweiss Scholarship

SGI Edelweiss Scholarship has been supporting young doctor from developing countries since 2013. The name of scholarship came from the lyrics "Small & White, Clean & Bright" of the song called "Edelweiss" which is the soundtrack of the "Sound of Music". This program has been designed to build a bright future of those young doctors by gathering pure and small gesture from the heart.
We welcome you to support those young doctors by making donations. The scholarship is open to all young doctors from developing countries, and the recipients will be selected by the scholarship committee. Your support will ease the financial burden of those in need so that they may participate in quality meetings and promote a balanced growth of our field across different regions.

For International Donator
Bank Name: KEB Hana Bank
Account No.: 576-910004-30032
Swift Code: HNBNKRSE

For Domestic Donator
Bank Name: KEB Hana Bank
Account No576-910013-92905

PRESENTATION GUIDELINES

Presentation Method & Type

Category	Presentation	Q&A
Overseas Speaker	Recording	Online real-time
	Onsite	Onsite
Korean Speaker	Onsite	Onsite

Lecture Time

Session	Allocated Time
Session 2, 6, 8, 10, 13, 17	15 minutes (12 minutes presentation+3 minutes Q&A)
Plenary Free Paper	10 minutes (7 minutes presentation+3 minutes Q&A)
Pearls of SGI Case Conference	15 minutes (10 minutes presentation+5 minutes Q&A)
Other Sessions	20 minutes (15 minutes presentation+5 minutes Q&A)

Preview Room

The speakers are required to check-in at the preview room to review their slide(s) and save the final versions.
Final presentation file(s) must be uploaded at least 1 hour before the start of the sessions.

Date	Time	Place
October 14 (Fri)	09:00-18:00	Drawing Room II (B1)
October 15 (Sat)	08:00-17:00	

E-Posters Display

Date	Time	Place
October 14 (Fri)	09:00-18:00	Grand Salon I+II (B1)
October 15 (Sat)	08:00-17:00	

Scientific Awards

SGI 2022 scientific committee will review all abstracts and presentations. After judging, the following awards will be given to the excellent presentation. Award certificate and prize will be given in Closing Ceremony.

- **Best Oral Presentation Awards: 3 winners / USD 500**
- **Oral Presentation Awards: 5 winners / USD 200**
- **E-poster Awards: 5 winners / USD 200**

INVITED FACULTIES

Mariano E. Giménez	University of Buenos Aires	Argentina
Jiaywei Tsauo	National Cancer Center/Cancer Hospital	China
Yang Zheng Qiang	First Affiliated Hospital of Nanjing Medical University	China
D. Nageshwar Reddy	Asian Institute of Gastroenterology & AIG Hospital	India
Mohan Ramchandani	Asian Institute of Gastroenterology	India
Hiroyuki Isayama	Juntendo University	Japan
Naoki Hosoe	Keio University	Japan
Shiro Miyayama	Fukui-ken Saiseikai Hospital	Japan
Takuji Iwashita	Gifu Municipal Hospital	Japan
Tatsuya Yamashita	Kanazawa University	Japan
Toshihiro Tanaka	Nara Medical University	Japan
Yousuke Nakai	The University of Tokyo	Japan
Yozo Sato	Cancer Institute Hospital of Japanese Foundation for Cancer Research	Japan
Tay Kiang Hiong	Singapore General Hospital	Singapore
Jung-Chun Lin	National Defense Medical Center	Taiwan
Rheun Chuan Lee	Taipei Veterans General Hospital	Taiwan
Peter D. Siersema	Radboud University Medical Center	The Netherlands
Alan Li	Manchester Royal Infirmary and Salford Royal Hospital	UK
Hans-Ulrich Laasch	The Christie, Manchester	UK
Sajjad Mahmood	Manchester University Hospitals NHS trust	UK
Charles Y. Kim	Duke University Medical Center	USA
Christopher C. Thompson	Brigham and Women's Hospital	USA
Edward Kim	The Mount Sinai Hospital	USA
Edward Lee	UCLA Medical Center	USA
Eun Ji Shin	The Johns Hopkins University	USA
Jeffrey H. Lee	MD Anderson Cancer Center	USA
Joo Ha Hwang	Stanford University	USA
Kenneth F. Binmoeller	California Pacific Medical Center	USA
Louis M. Wong Kee	Mayo Clinic	USA
Raymond E. Kim	University of Maryland	USA
Richard A. Kozarek	Virginia Mason Medical Center	USA
Sunguk Jang	Cleveland Clinic	USA
Ziv J. Haskal	University of Virginia	USA
Byung-Hoon Min	Sungkyunkwan University	Korea
Chae Hoon Kang	Eulji University	Korea
Cheol Min Shin	Seoul National University	Korea
Chung-Sik Gong	University of Ulsan	Korea
Dae Young Cheung	The Catholic University of Korea	Korea
Dai Hoon Han	Yonse University	Korea
Dayoung Ko	Seoul National University	Korea
Deok Ho Nam	SAM Hospital	Korea
Do Joong Park	Seoul National University	Korea
Dong Hee Koh	Hallym University	Korea

INVITED FACULTIES

Dong Jin Joo	Yonsei University	Korea
Dong Kee Jang	Seoul National University	Korea
Dong Soo Han	Hanyang University	Korea
Dong Wook Kim	University of Ulsan	Korea
Dong-Soo Kwon	KAIST, ROEN Surgical. Inc	Korea
Dong-Wan Seo	University of Ulsan	Korea
Dong-Won Ahn	Seoul National University	Korea
Dongwook Oh	University of Ulsan	Korea
Gun Ha Kim	University of Ulsan	Korea
Ho Kyoung Hwang	Yonsei University	Korea
Ho Young Song	University of Ulsan	Korea
Hwoon-Yong Jung	University of Ulsan	Korea
Hyoun Woo Kang	Seoul National University	Korea
Hyun Joo Jang	Hallym University	Korea
Hyun Pyo Hong	Sungkyunkwan Universtiy	Korea
Hyun-Ki Yoon	University of Ulsan	Korea
In Ja Park	University of Ulsan	Korea
In Rae cho	Seoul National University	Korea
Jae Hee Cheon	Yonsei University	Korea
Jae Hee Cho	Yonsei University	Korea
Jae Seok Bae	Seoul National University	Korea
Jeong Il Yu	Sungkyunkwan University	Korea
Jeong-Sik Byeon	University of Ulsan	Korea
Ji Hoon Shin	University of Ulsan	Korea
Ji Kon Ryu	Seoul National University	Korea
Ji Yeon Ha	Hallym University	Korea
Ji Yong Ahn	University of Ulsan	Korea
Jin Hong Kim	Ajou University	Korea
Jin Sil Kim	Ewha Womans University	Korea
Jin Woo Choi	Seoul National University	Korea
Jinhong Jung	University of Ulsan	Korea
Jinsoo Rhu	Sungkyunkwan University	Korea
Jinsu Kim	The Catholic University of Korea	Korea
Jong Ho Moon	Soon Chun Hyang University	Korea
Jong Hyouk Yun	Kosin University	Korea
Jong Kyun Lee	Sungkyunkwan University	Korea
Jonggi Choi	University of Ulsan	Korea
Joon Ho Kwon	Yonsei University	Korea
Joon Young Ohm	Chungnam National University	Korea
Jun Haeng Lee	Sungkyunkwan University	Korea
Jun Kyu Lee	Dongguk University	Korea
Kichang Han	Yonsei University	Korea
Kun Yung Kim	Jeonbuk National University	Korea

INVITED FACULTIES

Kwang Hyun Chung	Eulji University	Korea
Kwang-Woong Lee	Seoul National University	Korea
Min Soo Cho	Yonsei University	Korea
Min Woo Lee	Seoul Nationla University	Korea
Moon Won Lee	Pusan National University	Korea
Myungsu Lee	Seoul National University	Korea
Nuri Hyun Jeong	Kangwon National University	Korea
Sang Gyun Kim	Seoul National University	Korea
Sang Hyub Lee	Seoul National University	Korea
Sang Min Yoon	University of Ulsan	Korea
Sang Uk Han	Ajou University	Korea
Sangjoon Park	Catholic Kwandong University	Korea
Sang Hoon Kim	Dongguk University	Korea
Sang-Soo Lee	University of Ulsan	Korea
Se Woo Park	Hallym University	Korea
Seok Jeong	Inha University	Korea
Seong-Eun Kim	Ewha Womans University	Korea
Seung-Boo Yang	Soon Chun Hyang University	Korea
Seung-Bum Ryoo	Seoul National University	Korea
So Hyun Park	Gachon University	Korea
Soo-Young Na	The Catholic University of Korea	Korea
Soung Won Jeong	Soon Chun Hyang University	Korea
Su Hwan Kim	Seoul Nationla University	Korea
Su Jong Yu	Seoul National University	Korea
Sun Huh	Hallym University	Korea
Sung Bum Cho	Korea University	Korea
Sung Hyun Cho	University of Ulsan	Korea
Sung Ill Jang	Yonsei University	Korea
Sung-Gwon Kang	S&G Biotech Inc.	Korea
Sungsoo Park	Korea University	Korea
Sunyoung Lee	Yonsei University	Korea
Suyoung Park	Gachon University	Korea
Tae Jun Kim	Sungkyunkwan University	Korea
Tae Jun Song	University of Ulsan	Korea
Woo Hyun Baik	Seoul National University	Korea
Woohyung Lee	University of Ulsan	Korea
Yong-Tae Kim	Seoul National University	Korea
Young Deok Cho	Soon Chun Hyang University	Korea
Young Koog Cheon	Konkuk University	Korea
Young Suk Park	Seoul National University	Korea
Yun Hwan Kim	Presbyterian Medical Center	Korea
Yun Nah Lee	Soon Chun Hyang University	Korea

SCIENTIFIC PROGRAM

Day 1 October 14 (Friday)

Time	Room A	
09:00-10:20	**Session 1. Therapeutic modalities of various esophageal diseases** *Hwoon-Yong Jung (University of Ulsan, Korea), Sung-Gwon Kang (S&G Biotech Inc., Korea), Mohan Ramchandani (Asian Institute of Gastroenterology, India)*	
09:00-09:20	Refractory gastro-esophageal reflux disease	Mohan Ramchandani (Asian Institute of Gastroenterology, India)
09:20-09:40	Radiologic treatment of benign esophageal stricture	Kun Yung Kim (Jeonbuk National University, Korea)
09:40-10:00	Management of patients with T1b esophageal cancer	Cheol Min Shin (Seoul National University, Korea)
10:00-10:20	Salvage endoscopic resection after definitive chemoradiotherapy for esophageal cancer	Peter D. Siersema (Radboud University Medical Center, The Netherlands)
10:20-10:30	**Opening Ceremony**	
10:30-11:00	Coffee Break	
11:00-12:20	**Live Demonstration 1 (Hyderabad, India)** *Dong-Won Ahn (Seoul National University, Korea), D. Nageshwar Reddy (Asian Institute of Gastroenterology & AIG Hospital, India)*	
	Asian Institute of Gastroenterology & AIG Hospital	
12:20-13:20	**Luncheon**	
13:30-14:50	**Session 4. Malignant obstruction at the level of the distal duodenum: What is the most effective modality?** *Ho Young Song (University of Ulsan, Korea), Jin Hong Kim (Ajou University, Korea), Kenneth F. Binmoeller (California Pacific Medical Center, USA)*	
13:30-13:50	Conventional endoscopic stent placement	Louis M. Wong Kee Song (Mayo Clinic, USA)
13:50-14:10	Radiological stenting with a transhepatic / transgastric access	Jong Hyouk Yun (Kosin University, Korea)
14:10-14:30	EUS-guided gastrojejunostomy	Kenneth F. Binmoeller (California Pacific Medical Center, USA)
14:30-14:50	Surgical gastrojejunostomy for malignant obstruction at the level of the distal duodenum	Chung-Sik Gong (University of Ulsan, Korea)
14:50-15:20	Coffee Break	
15:20-16:40	**Session 7. Management of small bowel tumor** *Hyun Joo Jang (Hallym University, Korea), Jeffrey Lee (MD Anderson Cancer Center, USA), Joon Young Ohm (Chungnam National University, Korea)*	
15:20-15:40	Endoscopic diagnosis of small bowel tumor	Eun Ji Shin (The John Hopkins University, USA)
15:40-16:00	Radiological diagnosis of small bowel tumor	Jin Sil Kim (Ewha Womans University, Korea)
16:00-16:20	Endoscopic management of sporadic and familial duodenal adenoma: Confusion, conundrum, and cautions	Jeffrey Lee (MD Anderson Cancer Center, USA)
16:20-16:40	Surgical removal of small bowel tumor	Inja Park (University of Ulsan, Korea)
16:40-18:00	**Live Demonstration 2 (Barcelona, Spain)** *Ji Kon Ryu (Seoul National University, Korea), Ji Yong Ahn (University of Uisan, Korea)*	
	W.I.D.E.R Barcelona	

Time	Room B	
09:00-10:20	**Session 2. How to cope with ERCP/EUS related complications: Who do you call** *Sang-Soo Lee (University of Ulsan, Korea), Mariano E. Giménez (University of Buenos Aires, Argentina), Chae Hoon Kang (Eulji University, Korea)*	
09:00-09:15	Case based discussion	In Rae Cho (Seoul National University, Korea)
09:15-09:30	ERCP/EUS related complications - Bleeding, perforation	Kenneth F. Binmoeller (California Pacific Medical Center, USA)
09:30-09:45	ERCP/EUS related complications-post ERCP pancreatitis	Sajjad Mahmood (Manchester University Hospitals NHS trust, UK)
09:45-10:00	Surgical management for ERCP/EUS related complications	Mariano E. Giménez (University of Buenos Aires, Argentina)
10:00-10:15	Interventional radiologic approaches for ERCP/EUS related complications	Myungsu Lee (Seoul National University, Korea)
10:15-10:20	Q&A	
10:20-10:30	**Opening Ceremony** (Room A)	
10:30-11:00	Coffee Break	
11:00-12:20	**Session 3. Role of EUS for diagnosis and treatment of pancreatic cystic neoplasms** *Young Deok Cho (Soon Chun Hyang University, Korea), Eun Ji Shin (The John Hopkins University, USA), Jong Kyun Lee (Sungkyunkwan University, Korea)*	
11:00-11:20	Imaging diagnosis of the pancreatic cystic lesions	Jae Seok Bae (Seoul National University, Korea)
11:20-11:40	EUS-guided diagnosis of pancreatic cystic neoplasm	Eun Ji Shin (The John Hopkins University, USA)
11:40-12:00	Endoscopic ultrasound-guided cyst ablation	Sang Hyub Lee (Seoul National University, Korea)
12:00-12:20	Optimal timing and method of surgical treatment for pancreatic cyst	Mariano E. Giménez (University of Buenos Aires, Argentina)
13:30-14:50	**Session 5. The 20 most important studies in current management of advanced hepatocelluar carcinoma** *Jinsoo Rhu (Sungkyunkwan University, Korea), Edward Lee (UCLA Medical Center, USA), Tatsuya Yamashita (Kanazawa University, Japan)*	
13:30-13:50	The five most important studies on systemic treatment	Tatsuya Yamashita (Kanazawa University, Japan)
13:50-14:10	Improving outcome of liver resection and liver transplantation in combination with other treatment modalities under multidisciplinary approach in advanced hepatocellular carcinoma	Jinsoo Rhu (Sungkyunkwan University, Korea)
14:10-14:30	The five most important studies for TARE	Edward Kim (The Mount Sinai Hospital, USA)
14:30-14:50	The five most important studies on radiotherapy	Jinhong Jung (University of Ulsan, Korea)
14:50-15:20	Coffee Break	

SCIENTIFIC PROGRAM

Day 1 October 14 (Friday)

15:20-16:40	**Session 8. Management of solitary large HCC** ***Su Jong Yu (Seoul National University, Korea), Kwang-Woong Lee (Seoul National University, Korea), Rheun-Chuan Lee (Taipei Veterans General Hospital, Taiwan)***	
15:20-15:35	Multidisciplinary strategy of solitary large HCC	Su Jong Yu (Seoul National University, Korea)
15:35-15:50	Surgical management of solitary large HCC	Dong Jin Joo (Yonsei University, Korea)
15:50-16:05	TACE of solitary large HCC	Toshihiro Tanaka (Nara Medical University, Japan)
16:05-16:20	Radioembolization of solitary large HCC	Rheun-Chuan Lee (Taipei Veterans General Hospital, Taiwan)
16:20-16:35	Radiotherapy of solitary large HCC	Jeong Il Yu (Sungkyunkwan University, Korea)
16:35-16:40	Q&A	
16:40-18:00	**Session 10. HCC with bile duct invasion** ***Yong-Tae Kim (Seoul National University, Korea), Soung Won Jeong (Soon Chun Hyang University, Korea)***	
16:40-16:55	Treatment of HCC with bile duct invasion: Hepatologist's perspective	Jonggi Choi (University of Ulsan, Korea)
16:55-17:10	Endoscopic management of obstructive jaundice due to HCC with bile duct invasion	Kwang Hyun Chung (Eulji University, Korea)
17:10-17:25	Surgical management of HCC with bile duct invasion	Dai Hoon Han (Yonsei University, Korea)
17:25-17:40	Intra-arterial treatment of HCC with bile duct invasion	Shiro Miyayama (Fukui-ken Saiseikai Hospital, Japan)
17:40-17:55	External beam radiation therapy of HCC with bile duct invasion	Sang Min Yoon (University of Ulsan, Korea)
17:55-18:00	Q&A	

Time	Room C	
09:00-10:20	**Educational Session**	**Only video files**
09:00-09:10	Informative biliary cases	Suyoung Park (Gachon University, Korea)
09:10-09:20	Ablation for colorectal cancer lung metastasis	Hyun Pyo Hong (Sungkyunkwan University, Korea)
09:20-09:30	Embolotherapy of complex ectopic variceal bleeding	Jin Woo Choi (Seoul National University, Korea)
09:30-09:40	Interventional treatment for chylous ascites	Ji Hoon Shin (University of Ulsan, Korea)
09:40-09:50	Circumferential esophageal endoscopic submucosal dissection for high-grade dysplasia	Ji Yong Ahn (University of Ulsan, Korea)
09:50-10:00	Piecemeal endoscopic mucosal resection for large laterally spreading tumor in the ecum	Soo-Young Na (The Catholic University of Korea, Korea)
10:00-10:10	Bilateral biliary SEMS insertion using air cholangiography an balloon occlusion technique	Sang Hyub Lee (Seoul National University, Korea)
10:10-10:20	How to use two difference LAMSs	Tae Jun Song (University of Ulsan, Korea)

10:20-10:30	**Opening Ceremony** (Room A)	
10:30-11:00	Coffee Break	
11:00-12:20	**Pearls of SGI Case Conference** ***Seung-Boo Yang (Soon Chun Hyang University, Korea), Dong Hee Koh (Hallym University, Korea)***	
11:00-11:13	Simultaneous puncture of the common bile duct and intrahepatic bile duct under the X-ray fluoroscopy to connect both ducts	Jin Woo Choi (Seoul National University, Korea)
11:13-11:26	76-year old man with bile duct stricture	Jin Ho Choi (Seoul National University, Korea)
11:26-11:39	EUS-guided gastroenterostomy (EUS-GE)	Sung Hyun Cho (University of Ulsan, Korea)
11:39-11:52	Endoscopic rescue of dysfunction of EUS-guided jejuno-jejunostomy for relief of malignant afferent loop syndrome	Jung-Chun Lin (National Defense Medical Center, Taiwan)
11:52-12:05	Successful embolization of afferent loop ectopic varices with quick soluble gelfoam and NBCA via mesenteric venous approach	Gun Ha Kim (University of Ulsan, Korea)
12:05-12:18	Balloon-occluded retrograde abdominal lymphangiography and embolization for refractory postoperative chylous ascites: Two cases	Yozo Sato (Cancer Institute Hospital of Japanese Foundation for Cancer Research, Japan)
13:30-14:50	**Session 6. Cutting edge of diagnostic and therapeutic approach for Crohn's disease** ***Jae Hee Cheon (Yonsei University, Korea), Hyun Pyo Hong (Sungkyunkwan Univeristy, Korea), Naoki Hosoe (Keio University, Japan)***	
13:30-13:45	Case presentation; Differential diagnosis of small bowel ulcerative lesions focusing on capsule endoscopy	Su Hwan Kim (Seoul National University, Korea)
13:45-14:00	CT enterography or MR enterography	Jiyeon Ha (Hallym University, Korea)
14:00-14:15	Small bowel and Pan-enteric capsule endoscopy	Naoki Hosoe (Keio University, Japan)
14:15-14:30	Balloon-assisted enteroscopy	Jinsu Kim (The Catholic University of Korea, Korea)
14:30-14:45	Surgical approach and findings of Crohn's disease	Min Soo Cho (Yonsei University, Korea)
14:45-14:50	Q&A	
14:50-15:20	Coffee Break	
15:20-16:40	**Session 9. Cutting edge of diagnosis and management of obscure GI bleeding** ***Jeong-Sik Byeon (University of Ulsan, Korea), Tay Kiang Hiong (Singapore General Hospital, Singapore), Charles Y. Kim (Duke University, USA)***	
15:20-15:40	Interventional treatment of GI bleeding	Charles Y. Kim (Duke University, USA)
15:40-16:00	Role of capsule endoscopy in obscure gastrointestinal bleeding	Sang Hoon Kim (Dongguk University, Korea)
16:00-16:20	Challenging raidologic treatment cases	Joon Ho Kwon (Yonsei University, Korea)
16:20-16:40	Challenging surgical treatment cases	Seung-Bum Ryoo (Seoul National University, Korea)

SCIENTIFIC PROGRAM

Day 2 October 15 (Saturday)

Time	Room A	
08:00-09:20	**Live Demonstration 3 (Seattle, USA)** *Woo Hyun Baik (Seoul National University, Korea), Richard Kozarek (Virginia Mason Medical Center, USA)*	
	Virginia Mason Medical Center	
09:20-09:50	Coffee Break	
09:50-11:10	**Session 11. Safety and comfort issues of GI intervention** *Sang Uk Han (Ajou University, Korea), Ziv J. Haskal (University of Virginia, USA), Jun Haeng Lee (Sungkyunkwan University, Korea)*	
09:50-10:10	The most dangerous game: What healthcare has yet to learn from the airline industry about safety	Ziv J. Haskal (University of Virginia, USA)
10:10-10:30	Radiation hazard for intervention	Edward Lee (UCLA Medical Center, USA)
10:30-10:50	Ergonomics in interventional procedure: Endoscopic intervention	Jun Haeng Lee (Sungkyunkwan University, Korea)
10:50-11:10	Flexible robot technologies for advancement of endoscopic surgeries	Dong-Soo Kwon (KAIST, ROEN Surgical. Inc, Korea)
11:10-12:30	**Session 14. Clinical implication of obesity and sarcopenia** *Sangjoon Park (Catholic Kwandong University, Korea), Do Joong Park (Seoul National University, Korea), Christopher C. Thompson (Brigham and Women's Hospital, USA)*	
11:10-11:30	Advances in the endoscopic management of obesity	Christopher C. Thompson (Brigham and Women's Hospital, USA)
11:30-11:50	Body composition imaging for sarcopenia evaluation	Dong Wook Kim (University of Ulsan, Korea)
11:50-12:10	Bariatric and metabolic surgery in Asia	Sungsoo Park (Korea University, Korea)
12:10-12:30	Bariatric embolization	Charles Y. Kim (Duke University, USA)
12:30-13:30	**Luncheon Symposium (Korea Otsuka Pharm.)** *Hwoon-Yong Jung (University of Ulsan, Korea)*	
	Usefulness of Mucosta in GI and intervention field	Dae Young Cheung (The Catholic University of Korea, Korea)
13:30-13:40	Break	
13:40-15:00	**Session 17. Multidisciplinary management of gastric cancer-related bleeding** *Byung-Hoon Min (Sungkyunkwan University, Korea), Yozo Sato (Cancer Institute Hospital of Japanese Foundation for Cancer Research, Japan), Yang Zheng Qiang (First Affiliated Hospital of Nanjing Medical University, China)*	
13:40-13:55	Case presentation	Tae Jun Kim (Sungkyunkwan University, Korea)
13:55-14:10	Endoscopic management of gastric cancer bleeding	Moon Won Lee (Pusan National University, Korea)
14:10-14:25	Embolization of gastric cancer bleeding	Jiaywei Tsauo (National Cancer Center/Cancer Hospital, China)
14:25-14:40	Palliative radiotherapy of gastric cancer bleeding	Nuri Hyun Jeong (Kangwon National University, Korea)
14:40-14:55	Embolization of post-gastrectomy bleeding	Yozo Sato (Cancer Institute Hospital of Japanese Foundation for Cancer Research, Japan)
14:55-15:00	Q&A	
15:00-15:30	Coffee Break	
15:30-16:50	**Live Demonstration 4 (Seoul, Korea)** *Dong Kee Jang (Seoul National University, Korea), Soo-Young Na (The Catholic University of Korea, Korea)*	
	Asan Medical Center, Seoul	
16:50-17:10	**Closing & Awards Ceremony**	

Time	Room B	
08:00-09:20	**Plenary Free Paper** *Jun Kyu Lee (Dongguk University, Korea), Hyoun Woo Kang (Seoul National University, Korea)*	
08:00-08:10	Endoscopic resection of gastric gastrointestinal stromal tumor: The role of clip-and-cut endoscopic full-thickness resection	Yuri Kim (University of Ulsan, Korea)
08:10-08:20	3-year evaluation of a new regional protocol for post-radiation strictures after oesophageal cancer treatment	Hans-Ulrich Laasch (The Christie, Manchester, UK)
08:20-08:30	Results of the new technique of endoscopic treatment of patients with Zenker's diverticulum. More than 230 cases Single Center experience	Ivan Nedoluzhko (Moscow Clinical Scientific Center, Russian Federation)
08:30-08:40	Outcomes of percutaneously inserted lumen apposing metal stents and double J plastic stents used to treat pancreatic collections	Tim Fotheringham (The Royal London Hospital, UK)
08:40-08:50	Successful intubation using cap-assisted colonoscope for ERCP in patients undergoing Roux-en-Y reconstruction	Kyong Joo Lee (Hallym University, Korea)
08:50-09:00	Percutaneous transhepatic papillary balloon dilation versus ERCP for common bile duct stones: A multicenter prospective study	Bin Liu (The Second Hospital of Shandong University, China)
09:00-09:10	The role of direct peroral cholangioscopy for the detection of intraductal neoplasms of the bile duct	Il Sang Shin (Soon Chun Hyang University, Korea)
09:10-09:20	Safety and diagnostic accuracy of endoscopic ultrasound guided spleen biopsy in comparison with percutaneous biopsy	Junghwan Lee (University of Ulsan, Korea)
09:20-09:50	Coffee Break	
09:50-11:10	**Session 12. Multidisciplinary approach to gallbladder drainage in surgically high risk patients** *Yun Hwan Kim (Presbyterian Medical Center, Korea), Takuji Iwashita (Gifu Municipal Hospital, Japan), Jong Ho Moon (Soon Chun Hyang University, Korea)*	
09:50-10:10	Percutaneous gallbladder drainage: From insertion to removal	Ji Hoon Shin (University of Ulsan, Korea)
10:10-10:30	Endoscopic transpapillary gallbladder drainage: Strategy to improve clinical outcomes	Takuji Iwashita (Gifu Municipal Hospital, Japan)
10:30-10:50	EUS-guided gallbladder drainage: From beginners to experts	Se Woo Park (Hallym University, Korea)
10:50-11:10	Cholecystectomy: When and how	Woohyung Lee (University of Ulsan, Korea)

SCIENTIFIC PROGRAM

Day 2 October 15 (Saturday)

11:10-12:30	**Session 15. Management of pancreatic duct stricture** *Young Koog Cheon (Konkuk University, Korea), Sung Bum Cho (Korea University, Korea), Hiroyuki Isayama (Juntendo University, Japan)*	
11:10-11:30	Endoscopic management for pancreatic duct stricture (with novel stent / metal stent)	Jae Hee Cho (Yonsei University, Korea)
11:30-11:50	Endoscopic ultrasound-guided pancreatic duct drainage	Hiroyuki Isayama (Juntendo University, Japan)
11:50-12:10	Percutaneous radiologic intervention for pancreatic duct stricture	Kichang Han (Yonsei University, Korea)
12:10-12:30	Surgical management of pancreatic duct stricture (esp. chronic pancreatitis)	Ho Kyoung Hwang (Yonsei University, Korea)
12:30-13:30	**Luncheon Symposium (Korea Otsuka Pharm.)** *Hwoon-Yong Jung (University of Ulsan, Korea)*	
	Usefulness of Mucosta in GI and intervention field	Dae Young Cheung (The Catholic University of Korea, Korea)
13:30-13:40	Break	
13:40-15:00	**Session 18. How to improve diagnostic yield in indeterminate biliary stricture** *Seok Jeong (Inha University, Korea), Hans-Ulrich Laasch (The Christie, Manchester, UK), Chang-Hwan Park (Chonnam National University, Korea)*	
13:40-14:00	How to improve diagnostic yield in indeterminate biliary stricture: Percutaneous transluminal forceps biopsy	Hans-Ulrich Laasch (The Christie, Manchester, UK)
14:00-14:20	A novel method of biopsy technique	Tae Jun Song (University of Ulsan, Korea)
14:20-14:40	Optimal methods to improve diagnostic yield of cytology/biopsy	Sung Ill Jang (Yonsei University, Korea)
14:40-15:00	Utility of Single Operator Cholangioscopy (SOC) in indeterminate biliary stricture	Sunguk Jang (Cleveland Clinic, USA)
15:00-15:30	Coffee Break	
15:30-16:50	**Session 19. Cutting-edge technology for detection and diagnosis of IPNB** *Dong-Wan Seo (University of Ulsan, Korea), Sunguk Jang (Cleveland Clinic, USA), Deok Ho Nam (SAM Hospital, Korea)*	
15:30-15:50	Non-invasive imaging of intrahepatic malignant disease	Sunyoung Lee (Yonsei University, Korea)
15:50-16:10	Approaches to IPNB using single-operator peroral cholangioscopy	Yousuke Nakai (The University of Tokyo, Japan)
16:10-16:30	Approaches using direct peroral cholangioscopy	Yun Nah Lee (Soon Chun Hyang University, Korea)
16:30-16:50	Approaches using direct percutaneous transhepatic cholangioscopy	Dongwook Oh (University of Ulsan, Korea)

Time	Room C	
08:00-09:20	**Editorial Forum** *Sun Huh (Hallym University, Korea), Ziv J. Haskal (University of Virginia, USA)*	
08:00-08:20	How to increase the journal impact factor	Sun Huh (Hallym University, Korea)
08:20-08:40	Recent ethical issues on publication	Dong Soo Han (Hanyang University, Korea)
08:40-09:00	Do's and Don'ts when writing a paper for a journal	Peter D. Siersema (Radboud University Medical Center, The Netherlands)
09:00-09:20	How to be a successful journal reviewer	Ziv J. Haskal (University of Virginia, USA)
09:50-11:10	**Session 13. Cutting edge of EMR/ESD and NOTES techniques** *Sang Gyun Kim (Seoul National University, Korea), Joo Ha Hwang (Stanford University, USA), Hyun-Ki Yoon (University of Ulsan, Korea)*	
09:50-10:05	A new perspective to prevent bleeding after EMR/ESD - ulcer closure	Raymond E. Kim (University of Maryland Medical Center, USA)
10:05-10:20	Gastric per-oral endoscopic myotomy in patients with lung transplant	Joo Ha Hwang (Stanford University, USA)
10:20-10:35	Appropriate rescue therapy in recurrent lesions after colorectal EMR/ESD	Peter D. Siersema (Radboud University Medical Center, The Netherlands)
10:35-10:50	Hybrid surgery for gastrointestinal neoplasm (sentinel node navigation surgery)	Young Suk Park (Seoul National University, Korea)
10:50-11:05	Embolization of post-ESD bleeding	Suyoung Park (Gachon University, Korea)
11:05-11:10	Q&A	
11:10-12:30	**Session 16. Challenging cases; Short bowel syndrome** *Hwan Hun Chung (Korea University, Korea), Alan Li (Manchester Royal Infirmary and Salford Royal Hospital, UK)*	
11:10-11:30	Pathopysiology of short bowel syndrome	Alan Li (Manchester Royal Infirmary and Salford Royal Hospital, UK)
11:30-11:50	CT- and MR-enterography for post-op. evaluation	So Hyun Park (Gachon University, Korea)
11:50-12:10	Surgical approach for intestinal failure - when? to whom?	Dayoung Ko (Seoul National University, Korea)
12:10-12:30	Nutritional support in short bowel syndrome	Seong-Eun Kim (Ewha Womans University, Korea)
12:25-12:30	Q&A	
12:30-13:30	**Luncheon Symposium (Korea Otsuka Pharm.)** *Hwoon-Yong Jung (University of Ulsan, Korea)*	**(Room A+B)**
	Usefulness of Mucosta in GI and intervention field	Dae Young Cheung (The Catholic University of Korea, Korea)
13:30-13:40	Coffee Break	
13:40-16:50	**SGI Learning Center**	

E-POSTER EXHIBITION

SGI-P01 Experimental study on cyanobacteria-loaded hydrogel-coated self-oxygenated 125I seed combined stent for advanced esophageal cancer
Shuting Lu, Jinhe Guo (China)

SGI-P02 Endoscopic vacuum therapy for treatment gastrointestinal anastomotic leakages
Ivan Nedoluzhko, Anastasia Pyatakova, Kirill Shishin, Lada Shumkina (Russian Federation)

SGI-P03 Endoscopic interventions in treatment of submucosal tumors in the stomach
Ivan Nedoluzhko, Irina Khvorova, Kirill Shishin, Lada Shumkina (Russian Federation)

SGI-P04 Endoscopic treatment for chronic radiation proctitis
Ivan Nedoluzhko, Elena Grishina, Alexandr Leontyev, Kirill Shishin, Lada Shumkina (Russian Federation)

SGI-P05 Fluoroscopically guided balloon dilation of esophageal stricture in Plummer–Vinson syndrome: A report of two cases
Alrashidi Ibrahim (Saudi Arabia), Ji Hoon Shin (Korea)

SGI-P06 Endoscopic treatment of esophageal injuries using vacuum therapy
Murad Gasanov, Shagen Danielyan, Peter Yartsev (Russian Federation)

SGI-P07 Tumor oxygenation nanoliposome synergistic Hypoxia-Inducible-Factor-1 Inhibitor enhanced Iodine-125 seed brachytherapy for esophageal cancer
Xijuan Yao (China)

SGI-P08 Colorectal cancer incidence, Single center data results
Munkhsaruul Bayaraa, Bayasgalan Luvsandagva, Battulga Adyasuren, Narantsatsralt Jalbuu, Davaadorj Duger (Mongolia)

SGI-P09 Stent electrode for radiofrequency ablation in the rat esophagus: A preliminary study
Dong-Sung Won, Yubeen Park, Sang Soo Lee, Jung-Hoon Park (Korea)

SGI-P10 Outcomes of percutaneous trans-gastric endoluminal access used for single stage image guided procedures, a single centre study
Mohammed Rashid Akhtar, Mary Renton, Jimmy Kyaw Tun, Deborah Low, Ian Renfrew, Timothy Fotheringham (UK)

SGI-P11 Flexible 3D nanonetworked silica film as a polymer-free drug-eluting stent to suppress tissue hyperplasia in the rat esophagus
Jeon Min Kang, Chu Hui Zeng, Wooram Park, Joonseok Lee, Jung-Hoon Park (Korea)

SGI-P12 Efficacy and safety evaluation of hemostatic powder in Yucatan swine bleeding models
Jin Hee Maeng, Yu Su Yeol, Beom Hee Lee, Hui-Jin Lee, Eunhye Lee (Korea)

SGI-P13 Image-guided stent-directed irreversible electroporation for circumferential ablation in the rat esophagus
Song Hee Kim, Jeon Min Kang, Sang Soo Lee, Jung-Hoon Park (Korea)

SGI-P14 Photosensitizer-embedded intragastric satiety-inducing device to inhibit weight gain
Dae Sung Ryu, Ji Won Kim, Hee Kyong Na, Do Hoon Kim, Jin Hee Noh, Jung-Hoon Park, Hwoon-Yong Jung (Korea)

SGI-P15 Photoreactive intragastric satiety-inducing device for suppresses weight gain toward minimally invasive treatment
Ji Won Kim, Dae Sung Ryu, Hee Kyong Na, Do Hoon Kim, Jin Hee Noh, Kun Na, Jung-Hoon Park, Hwoon-Yong Jung (Korea)

SGI-P16 Cytomegalovirus enteritis in patient who underwent steroid treatment presenting as massive hematochezia
Kwangwoo Nam, Jinmo Kim, Sunghyeok Rhou, Won-Ae Lee (Korea)

SGI-P17 Clinical outcomes of endoscopic stent insertion or bypass operation for malignant colonic obstruction due to pancreatobiliary cancer
Chan Su Park, So Jeong Kim, Eun Ae Kang, Jihye Park, Jung Hyun Jo, Hee Seung Lee, Soo Jung Park, Moon Jae Chung, Jeong Youp Park, Jae Hee Cheon, Seungmin Bang, Seung Woo Park, Tae Il Kim, Si Young Song, Jae Jun Park (Korea)

SGI-P18 CircACTR2 upregulates CCL20 by sponging miR-10b-5p and recruiting EZH2 to promote gastric cancer
Chen Lu, Zekuan Xu (China)

SGI-P19 Endoscopic removal of invaginated adenoma of appendix
Ivan Nedoluzhko, Ivan Kanishchev, Kirill Shishin, Lada Shumkina (Russian Federation)

SGI-P20 Retrospective study on the Gastroscopy and histopathology finding of 1857 patients with various gastroscopy indications in Calmette hospital during 3 years (From 1st May 2016 to 31st December 2018)
Kaing Kimyi, Sorng Sophirom, Chea Khang, Chey Vithiarithy, Chea Ong, Chhit Dimanche, Unn Keoseyla, Un Seiha, Nov Neang, Mon Panha, Kang Khounthai, Um Sokchay, Uong Panha, Kann Sovannvireak, Sou Syphanna (Cambodia)

SGI-P21 Value of investigation among patients with chronic dyspepsia in Cambodia: A mono-center experience
Panha Mon, Chea Khang, Sorng Sophirom, Uong Panha, Nov Neang, Kang Khounthai, Kaing Kimyi, Un Seiha, Un Keoseyla, Kann Sovanvireak, Um Sokchay, Chhit Dimanche, Ny Tharuom, Chhay Kimpav, Khuon Viseth, Sann Channa, Chey Vithiarithy, Sou Syphana (Cambodia)

E-POSTER EXHIBITION

SGI-P22 **Endoscopic submucosal dissection for early gastric cancer that is not indicated for endoscopic resection in elderly patients**
Seokin Kang, Jeong Hoon Lee, Yuri Kim, Kwangbeom Park, Hee Kyong Na, Ji Yong Ahn, Kee Wook Jung, Do Hoon Kim, Kee Don Choi, Ho June Song, Gin Hyug Lee, Hwoon-Yong Jung (Korea)

SGI-P23 **Natural history of gastric leiomyoma**
Kwangbeom Park, Ji Yong Ahn (Korea)

SGI-P24 **Clinical outcomes of marginal ulcer bleeding compared with those of peptic ulcer bleeding**
Jun-Young Seo, Ji Young Ahn (Korea)

SGI-P25 **Risk factors of post-procedural fever in a patient who underwent esophageal endoscopic submucosal dissection**
Yuri Kim, Ho Jung Song, Hee Kyong Na, Ji Yong Ahn, Jeong Hoon Lee, Kee Wook Jung, Do Hoon Kim, Kee Don Choi, Gin Hyug Lee, Hwoon-Yong Jung (Korea)

SGI-P26 **Clinical outcomes of Dieulafoy's lesion compared to peptic ulcer in upper gastrointestinal bleeding**
Jin Hee Noh, Ji Yong Ahn, Hee Kyong Na, Jeong Hoon Lee, Kee Wook Jung, Do Hoon Kim, Kee Don Choi, Ho June Song, Gin Hyug Lee, Hwoon-Yong Jung (Korea)

SGI-P27 **Retrospective study of epidemiology, characteristic of dyspepsia in gastroenterology department at Khmer Soviet Friendship Hospital during a year from 1st January 2017 to 31st December 2018**
Kang Khoun Thai, Kang Chamroeun, Chhit Dimanch, Unn Keoseyla, Oum Sokchay, Un Sieha, Nov Neang, Mon Panha, Uong Panha, Kaing Kimyi, Kann Sovannvirak, Ny Tharuom, Khuon Viseth, Chhay Kimpav, Chey Vithiarithy, Sou Syphanna (Cambodia)

SGI-P28 **Efficacy of endoscopic vacuum therapy (E-VAC) in patients with various transmural defects of the upper gastrointestinal tract**
Jun Su Lee, Ji Yong Ahn (Korea)

SGI-P29 **Irritable bowel syndrome in atrial fibrillation: Novel therapeutic strategy in Asia**
Wei Syun Hu (Taiwan)

SGI-P30 **Efficacy and safety of novel hemostatic gel in endoscopic sphincterotomy or endoscopic papillectomy: A multicenter, randomized controlled clinical trial**
Jin Ho Choi, In Rae Cho, Sang Hyub Lee, Joo Seong Kim, Namyoung Park, Min Woo Lee, Dong Kee Jang, Woo Hyun Paik, Dong Won Ahn, Ji Kon Ryu, Yong-Tae Kim (Korea)

SGI-P31 **Closure of the defect after endoscopic papillectomy for reducing postoperative events**
Ivan Nedoluzhko, Ekaterina Khon, Kirill Shishin, Lada Shumkina (Russian Federation)

SGI-P32 **Endoscopic treatment of patients with large bile duct stones**
Yuri Teterin, Lomali Generdukaev, Tigran Enrike Rokhas Tadevosyan, Peter Yartcev, Dmitry Blagovestnov (Russian Federation)

SGI-P33 **Endoscopic papillectomy. Largest in Russia single centre experience**
Ivan Nedoluzhko, Ekaterina Khon, Kirill Shishin, Lada Shumkina (Russian Federation)

SGI-P34 **Radiofrequency ablation with silver nanofunctionalized stent for suppression of tissue hyperplasia and bacterial growth in rabbit bile duct**
Yubeen Park, Dong-Sung Won, Sang Soo Lee, Jung-Hoon Park (Korea)

SGI-P35 **Outcomes using percutaneous retrievable covered biliary stents for benign biliary strictures**
Tim Fotheringham, Marcus Deal, Farrukh Arfeen, Robert Hutchins (UK)

SGI-P36 **Outcomes using percutaneously retrievable covered biliary stents for persistent bile leaks**
Tim Fotheringham, Marcus Deal, Farrukh Arfeen, Mohammed Akhtar, Ajit Abrahams (UK)

SGI-P37 **Efficacy of Multi-Hole Self-Expanding Metallic Stent for the treatment of malignant distal biliary obstruction**
Tigran Enrike Rokhas Tadevosyan, Yuri Teterin, Peter Yartcev (Russian Federation)

SGI-P38 **Comparison between three types of needles for endoscopic ultrasound-guided tissue acquisition of pancreatic solid masses: A multicenter observational study**
Min Jae Yang, Se Woo Park, Jaihwan Kim (Korea)

SGI-P39 **EUS-guided tissue acquisition using novel torque technique are comparable with fanning technique in solid pancreatic lesions: multicenter, randomized trial**
Min Jae Yang, Kyong Joo Lee, Se Woo Park (Korea)

SGI-P40 **Prolonged patency of fully covered self-expandable metal stent with an externally anchored plastic stent in distal malignant biliary obstruction**
Jung Won Chun, Sang Myung Woo, Mira Han, Min Woo Lee, Jin Ho Choi, In Rae Cho, Woo Hyun Paik, Woo Jin Lee, Ji Kon Ryu, Yong-Tae Kim, Sang Hyub Lee (Korea)

E-POSTER EXHIBITION

SGI-P41 **Hemobilia from above papilla level and endoscopic hemostasis using fully covered self-expandable metal stent**
Junyeol Kim, Sang Hyub Lee, Jin Ho Choi, Min Woo Lee, Myoeng Hwan Lee, In Rae Cho, Woo Hyun Paik, Ji Kon Ryu, Yong-Tae Kim (Korea)

SGI-P42 **Diagnostic performance of the 20G forward-bevel needle (ProCore®) for various pancreatic lesions: Comparison of PDAC with non-PDAC**
Junghwan Lee, Tae Jun Song, Dong Wook Oh, Do Hyun Park, Sang Soo Lee, Dong Wan Seo, Sung Koo Lee (Korea)

SGI-P43 **Effect of preventive use of antibiotics before percutaneous hepatic puncture biliary drainage on postoperative biliary infection**
Zheyu Jiang, Lizhou Wang, Lizhou Wang (China)

SGI-P44 **Comparison of outcomes of different self-expandable metal stents for EUS-guided hepaticogastrostomy: Fully covered and partially covered metal stent**
Tae Jun Song, Seong Hyun Cho, Seong Je Kim (Korea)

SGI-P45 **Utility of predictors for preoperative choledocholithiasis risk and establishment of reference point for predictors in patients with calculous cholecystitis or symptomatic cholelithiasis**
Junghun Woo, Kihyun Ryu, Youngwoo Choi, Youngwoo Kang, Kyuchan Huh, Taehee Lee, Sunmoon Kim, Hoonsup Koo, Daesung Kim, Sanghyuk Lee, Hyeyeon Jeon (Korea)

SGI-P46 **The effect of endoscopic gallbladder drainage in the prevention of biliary complications in patients with concurrent gallbladder and common bile duct stones**
Myeong Hwan Lee, Woo Hyun Paik, Min Woo Lee, Jin Ho Choi, In Rae Cho, Sang Hyub Lee, Ji Kon Ryu, Yong-Tae Kim (Korea)

SGI-P47 **The role of endoscopic ultrasound-guided fine needle aspiration and biopsy in diagnosing autoimmune pancreatitis: A single center experience**
Yun Je Song, Tae Jun Song (Korea)

SGI-P48 **Severity of thrombocytopenia with different grades of esophagel varices in cirrhotic patients**
Panha Uong, Chey Vitihiarithy, Kang Khounthai, Un Seiha, Unn Keoseyla, Khuon Viseth, Ny Tharuom, Mon Panha, Kann Sovannvireak, Kaing Kimyi, Chhit Dimanche, Um Sokchay, Nov Neang, Chay Kimpav, Sou Syphana (Cambodia)

SGI-P49 **CHA 2 DS 2-VASc score in the prediction of ischemic bowel disease among patients with atrial fibrillation**
Wei Syun Hu (Taiwan)

SGI-P50 **Different routes of administering EW-7197 versus EW-7197 · HBr for preventing peritoneal adhesion in a rat model**
Chu Hui Zeng, Song Hee Kim, Dae-Kee Kim, Ji Hoon Shin, Jung-Hoon Park (Korea)

SGI-P51 **Optimising conscious sedation using EEG BIS monitoring**
Alexander Oh, Naushad Karim, Andy Pitt, Scott Hodgetts, Gregory Royle, Liam Maxfield, Damian Mullan, Derek Edwards, Hans-Ulrich Laasch (UK)

SGI-P52 **Evaluation of efficacy and resorption of embolic agents in rat and porcine embolization model**
Yu Su Yeol, Jin Hee Maeng, Hui-Jin Lee, Daesung Lee, Li Yi Xian, Eunhye Lee (Korea)

SGI-P53 **A novel m5C methylated lncRNA NR033928 promotes gastric cancer progression by promoting GLS mediated glutamine metabolism**
Fang Lang, Xu Zekuan (China)

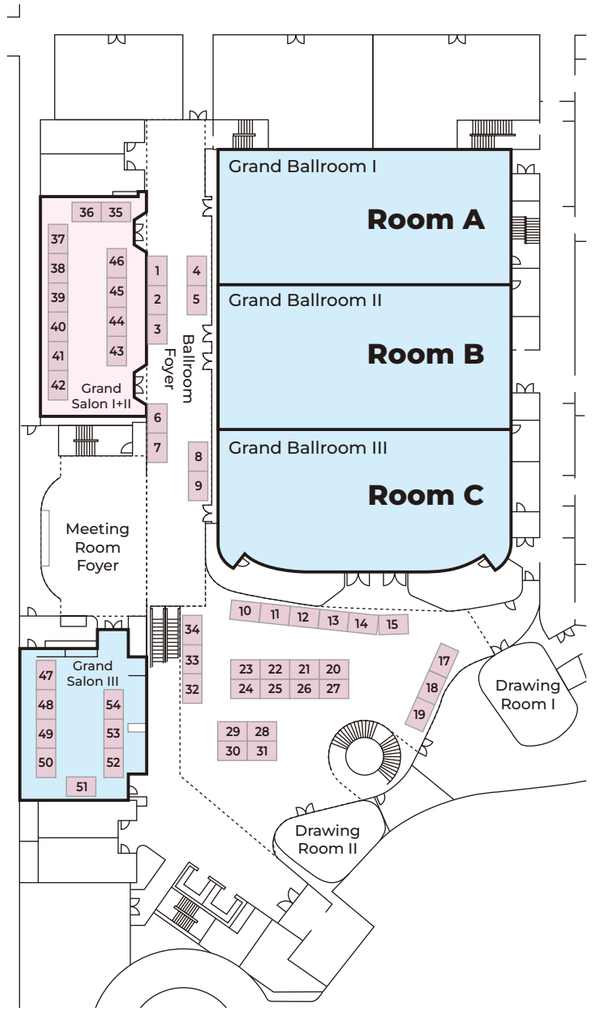
SGI-P54 **Competency of junior doctors in identifying misplaced nasogastric tubes in the deteriorating patient**
Ojoma Emeje, Arjun Thayyil, Iona Bell (UK)

SGI-P55 **Retrospective study of epidemiology, clinic and main etiologies of anal pain among 620 patients at Calmette and Khmer Soviet Friendship Hospitals, during a years**
Kang Khoun Thai, Mak Sopheak, Chea Ong, Chea Khang, Unn Keoseyla, Oum Sokchay, Un Seiha, Nov Neang, Uong Panha, Mon Panha, Kaing Kimyi, Kann Sovannvirak, Kang Chamroeun, Ny Tharuom, Chhay Kimpav, Khuon Viseth, Sann Channa, Chey Vithiarithy, Sou Syphanna (Cambodia)

SGI-P56 **Usage of POEM for the treatment of achalasia in patients older 60 years**
Ivan Kanishchev, Kirill Shishin, Lada Shumkin (Russian Federation)

INDUSTRIAL EXHIBITION

Date	Time	Place
October 14 (Fri)	09:00-18:00	Grand Foyer + Ballroom Foyer Grand Salon I+II, III (B1)
October 15 (Sat)	08:00-17:00	



Booth No.	Company Name
1~5	Daewoong Pharmaceutical Co., Ltd.
6~9	Korea Otsuka Pharmaceutical
10~12	YUHAN
13-15	GC Pharma
17	Bracco Imaging Korea
18-19	HK inno.N
20-21	Chong Kun Dang Pharmaceutical Corp.
22-23	JEIL PHARMACEUTICAL CO.,LTD
24-25	Dongkook Lifescience
26-27	OLYMPUS KOREA
28-29	SK chemicals
30-31	Guerbet Korea
32-34	Pharmbio Korea Inc.
35-36	Korea United Pharm.
37-38	Dong-A ST
39-40	Myungmoon Pharm.
41-42	TAEWOONG MEDICAL
43	Eisai Korea Inc.
44	GE Healthcare
45	Bayer Korea
46	Central Medical Service
47	Cook Medical Korea
48	Hanmi Pharm Co., Ltd.
49	Boston Scientific Korea Co., Ltd
50	KyungDong pharm.co.,Ltd
51	ILDONG PHARMACEUTICAL
52	BCM Co., Ltd
53	IL-YANG Pharmaceutical Co.,Ltd
54	JW Pharmaceutical

PARTNERS & SPONSORS

The Society of Gastrointestinal Intervention (SGI) wishes to acknowledge and thank the following companies for their support.

Platinum

DAEWOONG PHARMACEUTICAL CO.,LTD.

Gold

Otsuka Korea Otsuka Pharm.

Sliver

YUHAN

Pharmbio Korea Inc.

GC Pharma

Bronze

JEIL PHARMACEUTICAL CO.,LTD.

SK chemicals

Guerbet Contrast for Life

Dongkook Lifescience

OLYMPUS

Chong Kun Dang Pharm

inno.N

Supported by

인천관광공사 Incheon Tourism Organization

인천광역시 Incheon Metropolitan City

Society of Gastrointestinal Intervention

ABSTRACTS

CONTENTS

INVITED LECTURES

CONTENTS

INVITED LECTURES

CONTENTS

INVITED LECTURES

PLENARY FREE PAPER

CONTENTS

POSTER EXHIBITION

CONTENTS

POSTER EXHIBITION

CONTENTS

POSTER EXHIBITION

Society of Gastrointestinal Intervention

INVITED LECTURES

Session 1-1

Refractory gastro-esophageal reflux disease

Mohan Ramchandani, Partha Pal

Department of Gastroenterology, Asian Institute of Gastroenterology, Hyderabad, India

Introduction

Refractory gastroesophageal reflux disease (GERD) refers to poor symptom response to twice daily proton pump inhibitors (omeprazole 20 mg equivalent). GERD may not be the underlying pathology in in so called refractory GERD (Figure 1). The most common cause (60-70%) of refractory GERD is not reflux related and are due to pathologies like rumination syndrome, motility disorders, eosinophilic esophagitis and functional dysplasia. Whereas reflux related refractory symptoms could be due to acidic or non-acidic reflux (e.g., bile reflux). Hence refractory GERD is a misnomer and should be replaced by refractory GERD symptoms to PPI/H2 Receptor Antagonist / Prokinetics/Alginates. A step wise approach is warranted to identify the underlying pathology and subsequent treatment.

Stepwise management of refractory GERD[1]

Step 1: Take detailed history: Compliance to diet and medications, symptom improvement after PPI use and likelihood of GERD should be ascertained.

Step 2: Complete twice daily PPI trial for at least 2-3 months (if not done already); atypical symptoms may take long time to respond. Hence at least 2-3 months trial should be given.

Step 3: Risk stratification and pre test probably of refectory GERD. Partial response to PPI increases the likelihood of having refractory GERD. Patients with high pre test probability are subjected to on PPI 24 hour pH monitoring whereas those with low probability are subjected to off PPI testing (figure 2).

Step 4: Additional testing to ascertain mechanism of refractory symptoms. 24 -48 hour pH monitoring, endoscopy barium swallow and gastric emptying studies are helpful in this regard.

Step 5: Finding the diagnosis/reason for refractory symptoms: 24 hour pH metry can identify reflux hypersensitivity of functional heart burn the management of which differs . Combined impedance measurement can help identify non-acidic reflux. 24 hour pH metry is important to quantitate reflux and can be done upfront in patients with atypical GERD symptoms. The detection of nocturnal acid breakthrough (NAB) may require a dual pH probe (distal channel in stomach).In spite of NAB, esophageal acidification and symptoms may not occur in patients with GERD during 24-h pH monitoring.2 Endoscopy can be helpful to diagnose peptic stricture, eosinophilic esophagitis and para-esophageal hernia. Endoscopy with biopsy is the best diagnostic test for assessing mucosal injury. Esophageal manometry/barium swallow help to rule out esophageal motility disorders (specially in those with dysphagia) and gastric scintigraphy help identify delayed gastric emptying.[1]

Step 6: Treat reflux with adjunctive medical therapy (addition of bedtime H2 blockers, alginates or sucralfate) or anatomical interventions (surgical or novel endoscopic therapies).

Medical management options

1. Adding a double dose H2 receptor blockers at bedtime[3]
2. Use of sodium alginate with meals
3. Use of sucralfate to heal erosive esophagitis

Anatomic interventions

1. Traditional surgery (fundoplication: Nissen, Tourpet) or Roux-en-Y gastric bypass (in morbidly obese: lower in hospital complications)

- **Indications**

1. Long-term management over PPI (select patients with low surgical risks and objectively confirmed GERD)
2. Persistent proven GERD symptoms or esophageal mucosal damage despite maximal medical therapy (Refractory GERD)
3. Significant structural disruption at the esophagogastric junction (EGJ) (eg, large hiatus hernia).

- Nissen Fundoplication : 360 degree wrap of funds around the EGJ. It is mostly done laparoscopically. Long term follow up studies have shown lower relapse as compared to PPI. 90% are symptom free at 10 years and 60% off PPI at 17 years.4,5 Most common side effects are gas bloat (15-20%) and dysphagia.
- Recurrent GERD post surgery are due to : a) improper indication, b) an incomplete preoperative evaluation, c) inadequate surgical technique.

2. Magnetic sphincter augmentation (MSA)

- Titanium rings encasing magnetic cores are placed surgically around the lower esophageal sphincter (LES) to augment the LES pressure to 15 mm Hg. This allows for a dynamic opening of LES allowing belching and vomiting with lower risk of dysphagia as compared to traditional surgery.[6]

3. Endoscopic antireflux surgery

A. Endoscopic fundoplication aiming to reconstruct the LES [e.g., GERD-X (G-SURG GmbH, Seeon-Seebruck, Germany), MUSE (Medigus, Omer, Israel), Esophyx (EndoGastric Solutions, Redmond, WA, USA)]

1. GERD- X is a single use full thickness plicator device which is modified from original plicator device (NDO Surgical Inc., Mansfield, MA). The procedure is done under general anaesthesia in which the device is passed over the guidewire into the stomach followed by passage of pediatric endoscope through the device to visualise the gastric cardia (Figure 3). After retroflexion of the device, plicator arms are opened and tissue is pulled into the tissue retractor after multiple rotations following which transmural pledged sutures were placed. Additional sutures can be placed for a tighter closure.7 Two randomized controlled trials evaluated the efficacy of NDO plicator device compared to laparoscopic fundoplication and found better reflux control with the later.8,9 Two prospective studies have shown the efficacy of the new GERD-X device in improving symptoms and GERD-HRQL score in 28 patients at three months follow up without major side effects.10,11 A recently published RCT including seventy patients with PPI dependent GERD showed significant improvement in GERD- HRQL score with GERD-X (65.7% vs 2.9% in sham; p<0.001) with PPI independence in 62.8% of patients at 12 months compared to 11.4% in the sham group (p<0.001). No major procedure-related adverse events were noted in either group.12 The results of GERD-X is best in PPI dependant non erosive reflux disease.[7]

2. Transoral Incisionless Fundoplication (TIF) by Esophyx device is used to construct a 270° fundoplication to reduce angle of His and small hiatus hernia. In the newer version of TIF (TIF 3.0), the H-shaped transmural fasteners (12-20) across two full thickness layers of EGJ tissue upto 3-5 cm proximal to the EGJ to create a long and more physiological valve. The device is introduced into the stomach loading over a compatible gastroscope which is retroflexed and tissue is drawn into the device with a helical tissue screw to create a valve. A large meta-analysis of 32 studies and 1475 patients have shown the the safety and efficacy of TIF in

refractory GERD.13 Technical success rate is 99% with PPI discontinuation in 89% with significant improvement in GERD-HRQL. 5 years follow up data from the TEMPO (Transoral EsophyX vs Medical Ppi Open-label) trial showed sustained improvement in GERD-HRQL score from at one year and at five years with 46% completely stopping PPI. 14,15 A meta-analysis (7 trials, 1128 patients) comparing TIF with fundoplication and PPI showed that TIF had a highest probability of increasing GERD-HRQL score while fundoplication had the highest likelihood of decreasing acid exposure and increasing LES pressure.16 TIF is generally considered a safe major adverse event rate of only 2%. Common adverse events include dysphagia, bloating, nausea chest and epigastric pain.

B. Radiofrequency energy delivery to augment LES pressure [Stretta (Mederi Therapeutics, Norwalk, CT, USA)]

A single use catheter with a four-channel radiofrequency generator and four nitinol needle electrodes is used in Stretta system to deliver radiofrequency energy to muscles of LES and gastric cardia to an area two cm above and below EGJ. After advancing the catheter to the squamocolumnar junction over a guidewire passed through a standard endoscope, the balloon basket assembly at the tip of the catheter is inflated to introduce the four needles into the muscularis propria. Radio frequency energy is delivered to four additional sites by manoeuvring the catheter at 45 degrees. Stretta uses 465 mHz and 5W of power output with 65°C-85°C temperature in the muscularis propria. It works by causing LES muscle hypertrophy, reducing transient LES relaxations (TLESRs) and esophageal acid sensitivity.7 In two large meta-analysis of 1441 and 2468 patients respectively, Stretta showed improvements in GERD -HRQOL score with reduced acid exposure time with increase in basal LES pressure. The procedure has demonstrated long-term safety and efficacy on 10 years follow up with improvement in GERD-HRQL score and reduction in PPI use.17,18 However, another systematic review and meta-analysis including 4 RCTs shown no significant difference between Stretta and sham therapy.19 Normalization of AET and PPI independence were the end points leading to the divergent results. Further Randomised controlled trials are warranted in this regard.

C. Mucosal resection/ablation for gastric cardia constriction. (ARMS, ARMA)

1. Anti Reflux Mucosectomy (ARMS) ARMS is a novel endoscopic technique which involves crescentic resection of half to two-thirds of the circumference of mucosa along the lesser curvature for 3 cm length (1 cm in esophagus and 2 cm in stomach) using endoscopic mucosal resection (EMR)/ submucosal dissection technique (ESD). Scar formation in gastric side leading to narrowed cardia opening is responsible for therapeutic effect. A pilot study including 10 patients by Inoue et al. showed reduction in acid exposure time, improvement in DeMeester score and discontinuation of PPI in all patients.20 Hedberg et al. have shown significant improvement in GERD-HRQL score with ARMS.21 Maydeo et al. showed significant improvement in DeMeester score in nearly three-fourth of patients (total=62) with improvement in mean GERD- HRQL score. Dysphagia requiring balloon dilation is seen on follow up in less than 10% whereas perforation requiring endoscopic closure or throracoscopic drainage have been reported.22 A retrospective study including 109 patients with PPI refractory GERD undergoing ARMS showed significant improvement in acid exposure time, sustained improvement in GERD-HRQL score over 1 year and PPI discontinuation in more than half of the patients.[23]

2. Anti-reflux Mucosal Ablation (ARMA): This can be used as a primary therapy or as rescue therapy after ARMS in PPI refractory GERD. An area of normal mucosa along the lesser curvature of 1.5 times scope diameter width is left around gastric cardia to prevent stenosis. The area is cauterized using an electrocautery generator after creating a submucosal cushion with saline and indigo carmine after retroflexion the gastroscope. In a pilot study by Inoue and colleagues, 12 patients with PPI refractory GERD (ten naïve and two patients with failed ARMS), the GERD-HRQL score and DeMeester score from improved significantly without any major adverse events.24 An interim analysis of 29 patients by Kalapala et al. showed improvement in GERD-HRQL score, DeMeester score and AET with no major adverse effects reported.25 Mucosal ablation/resection therapy does not require any special device, and re-treatment can be considered after failure or inadequate response. i However, long term studies are warranted to validate this therapy.

Conclusion: If a patient continues to be symptomatic despite PPI therapy, confirm refractory GERD by 24 hour pH metry/ impedance studies. Refractory symptoms may be reflux (acidic or non-acidic) or non-reflux related. The endoscopic anti-reflux therapies aim to be less invasive and reduce post-operative problems related to fundoplication. Prior to any anatomic intervention for GERD, esophagogram and manometry are required to rule out motility disorder. The emerging data on long-term safety and efficacy of these techniques is reassuring however needs further validation. They can act as a bridge between PPI and anti-reflux surgery. However, most studies studying endoscopic anti-reflux therapy exclude significant structural EGJ disruption (eg, hiatus hernia larger than 2 cm), esophagitis LA grade C or D and GERD complications. The predictive factors of response to endoscopic therapy need to be studied in future.

References

1. Yadlapati R, DeLay K. Proton Pump Inhibitor-Refractory Gastroesophageal Reflux Disease. Med Clin North Am. 2019 Jan;103(1):15-27.
2. Ghoshal UC, Blaachandran A, Rai S, Misra A. Nocturnal acid breakthrough and esophageal acidification during treatment with dexlansoprazole as compared to omeprazole in patients with gastroesophageal reflux disease. Indian J Gastroenterol. 2022 Jun 30. doi: 10.1007/s12664-022-01270-3. Epub ahead of print. PMID: 35771390.
3. Wang Y, Pan T, Wang Q, Guo Z. Additional bedtime H2-receptor antagonist for the control of nocturnal gastric acid breakthrough. Cochrane Database Syst Rev. 2009 Oct 7;(4):CD004275.
4. Spechler SJ, Lee E, Ahnen D, Goyal RK, Hirano I, Ramirez F, Raufman JP, Sampliner R, Schnell T, Sontag S, Vlahcevic ZR, Young R, Williford W. Long-term outcome of medical and surgical therapies for gastroesophageal reflux disease: follow-up of a randomized controlled trial. JAMA. 2001 May 9;285(18):2331-8.
5. Galmiche JP, Hatlebakk J, Attwood S, Ell C, Fiocca R, Eklund S, Långström G, Lind T, Lundell L; LOTUS Trial Collaborators. Laparoscopic antireflux surgery vs esomeprazole treatment for chronic GERD: the LOTUS randomized clinical trial. JAMA. 2011 May 18;305(19):1969-77.
6. Dunn C, Bildzukewicz N, Lipham J. Magnetic Sphincter Augmentation for Gastroesophageal Reflux Disease. Gastrointest Endosc Clin N Am. 2020 Apr;30(2):325-342
7. Kalapala R, Singla N, Reddy DN. Endoscopic management of gastroesophageal reflux disease: Panacea for proton pump inhibitors dependent/refractory patients. Dig Endosc. 2022 May;34(4):687-699.
8. Antoniou, S.A., O.O. Koch, A. Kaindlstorfer, et al. 2012. Endoscopic full-thickness plication versus laparoscopic fundoplication: a prospective study on quality of life and symptom control. Surg. Endosc. 2012;26:1063–68.
9. Kaindlstorfer A, Koch O, Antoniou SA, et al. A Randomized Trial on Endoscopic Full-Thickness Gastroplication Versus Laparoscopic Antireflux Surgery in GERD Patients Without Hiatal Hernias. Surg Laparosc Endosc Percutan Tech 2013;23:212–22
10. Weitzendorfer M, Spaun GO, Antoniou SA, et al. Interim report of a prospective trial on the clinical efficiency of a new full-thickness endoscopic placation device for patients with GERD: impact of changed suture material. Surg Laparosc Endosc Percutan Tech. 2017;27:163-69.
11. Weitzendorfer M, Spaun GO, Antoniou SA, Witzel K, Emmanuel K, Koch OO. Clinical feasibility of a new full-thickness endoscopic plication device (GERDx™) for patients with GERD: results of a prospective trial. Surg Endosc. 2018 May;32(5):2541-2549.
12. Kalapala R, Karyampudi A, Nabi Z, et al. Endoscopic full-thickness plication for the treatment of PPI-dependent GERD: results from a randomised, sham controlled trial. Gut 2021;0:1–9.
13. McCarty TR, Itidiare M, Njei B, et al. Efficacy of transoral incisionless fundoplication for refractory gastroesophageal reflux disease: a systematic review and meta-analysis. Endoscopy 2018.50:708-25
14. Hunter JG, Kahrilas PJ, Bell RC et al. Efficacy of transoral fundoplication vs omeprazole for treatment of regurgitation in a randomized controlled trial. Gastroenterology 2015 Feb;148(2):324-333.e5.
15. Trad KS, Barnes WE, Prevou ER, et al. The TEMPO trial at 5 years: transoral fundoplication (TIF 2.0) is safe, durable, and cost-effective. Surg Innov. 2018;25:149-57.
16. Richter JE, Kumar A, Lipka S, et al. Efficacy of laparoscopic Nissen fundoplication vs transoral incisionless fundoplication or proton pump inhibitors in patients with gastroesophageal reflux disease: a systematic review and network meta-analysis. Gastroenterol 2018;154:1298–08.e7.
17. Noar M, Squires P, Noar E. Lee M. Long-term maintenance effect of radiofrequency energy.delivery for refractory GERD: a decade later. Surg Endosc.2014;28:2323-33
18. Dughera L, Rotondano G, De Cento M, et al. Durability of Stretta radiofrequency treatment for GERD: results of an 8-year follow-up. Gastroenterol Res Pract 2014;2014: 531907.
19. Lipka S, Kumar A, Richter JE. No evidence for efficacy of radiofrequency ablation for treatment of gastroesophageal reflux disease: a systematic review and meta-analysis. Clin Gastroenterol Hepatol 2015;13:1058–67.e1
20. Inoue H, Ito H, Ikeda H, et al. Anti-reflux mucosectomy for gastroesophageal reflux disease in the absence of hiatus hernia: a pilot study. Ann Gastroenterol. 2014;27:346-51.

21. Hedberg HM, Kuchta K, Ujiki MB. First experience with banded anti-reflux mucosectomy (ARMS) for GERD: feasibility, safety, and technique (with video). J Gastrointest Surg. 2019;23:1274-78.
22. Patil G, Dalal A, Maydeo A. Feasibility and outcomes of anti-reflux mucosectomy for proton pump inhibitor dependent gastroesophageal reflux disease: First Indian study (with video). Dig Endosc. 2020 Jul;32(5):745-752.
23. Sumi K, Inoue H, Kobayashi Y, Iwaya Y, Abad MRA, Fujiyoshi Y, Shimamura Y, Ikeda H, Onimaru M. Endoscopic treatment of proton pump inhibitor-refractory gastroesophageal reflux disease with anti-reflux mucosectomy: Experience of 109 cases. Dig Endosc. 2021 Mar;33(3):347-354.
24. Inoue H, Tanabe M, de Santiago ER, et al. Antireflux mucosal ablation (ARMA) as a new treatment for gastroesophageal reflux refractory to proton pump inhibitors: a pilot study. Endosc. Int. Open 2020;8:E133–38.
25. Kalapala, N Jagtap, Z Nabi et al. Anti-Reflux Mucosal Ablation (ARMA) For Refractory Gastroesophageal Reflux Disease–An Interim Analysis. Endosc. 2021;53:S87.

Figure legends

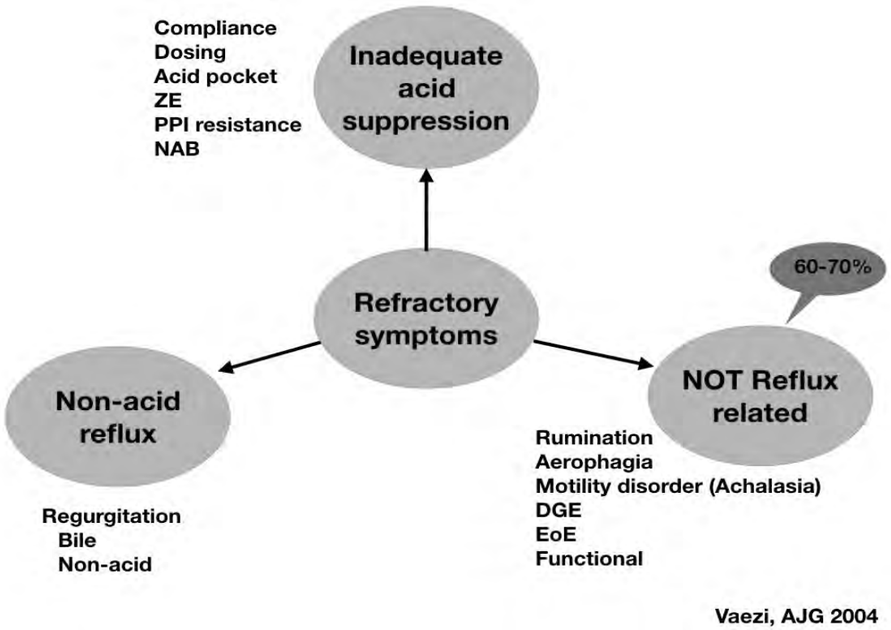


Figure 1. Causes of refractory gastroesophageal reflux disease (GERD) symptoms; ZE- Zollinger Ellison Syndrome, NAB- nocturnal acid breakthrough, PPI- proton pump inhibitors, DGE- delayed gastric emptying, EoE- eosinophilic esophagitis

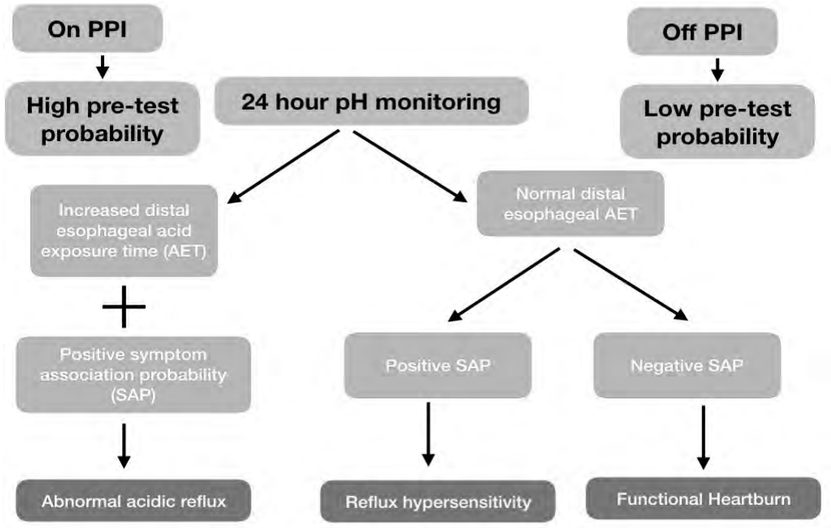


Figure 2. Approach to 24 hour pH monitoring for gastroesophageal reflux disease

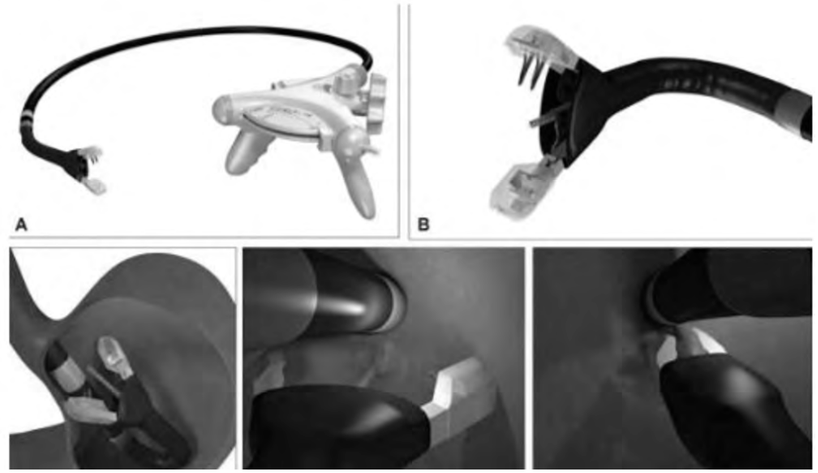


Figure 3- GERDx Procedure

Session 1-2

Radiologic treatment of benign esophageal stricture

Kun Yung Kim

Department of Radiology, Jeonbuk National University Hospital, Jeonbuk National University Medical School, Jeonju, Korea

Introduction

Benign esophgeal stricture can result from developmental, inflammatory, neuromuscular, and iatrogenic causes (1). Some conditions are multifactorial in origin, thus in the broadest sense, benign esophageal stricture is therefore any abnormally stenotic segment of the esophagus except for those by malignancy. The mainstay of therapy for benign esophageal stricture is dilation. Two main categories of dilators have been used: serial dilators of gradually increasing diameter (bougies) and catheter-mounted balloon dilators. Unguided bougies can enter the airway or fail to engage the stricture, therefore should be avoided. Thus, contemporary dilation techniques are using catheter-mounted and wire-directed balloon catheters. The guidewire serves to direct the balloon catheter through the esophagus.

Technical Perspectives of Esophageal Dilation

1. The Use of Fluoroscopy

Balloon dilation can be performed under fluoroscopic and/or endoscopic guidance. The former usually performed by interventional radiologists, and the latter by gastroenterologists (2). Advantage of endoscopic guidance is direct vision of the dilation with immediate post-dilation assessment, allowing identification of bleeding or perforation. In the other hands, advantage of fluoroscopic guidance is to visualize entire lesion and guidewire, allowing accurate placement of the balloon catheter. If endoscope can not pass through the stricture, it is advocated for the routine use of fluoroscopy, but there is ongoing controversy concerning the need for fluoroscopy.

2. Classification of Esophageal Strictures and Balloon Dilation Technique

Approach could be varied with morphologic characteristics of the esophageal stricture and the nature of the underlying condition. Schatzki's ring and esophageal are thin, ring-like structures are best ruptured rather than dilated. Esophageal stricture refers stenotic lesions that arr fixed in diameter and of definable length. It could be developmental or iatrogenic (e.g., anastomotic stricture, radiation stricture). Strictures could be classified as simple or complex. Simple strictures are short with a tapered margin. It is relatively compliant and offers minimal resistance. Complex structures are long, irregular shape, or have diffuse narrowed lumen. Guidewire-directed balloon dilation under fluoroscopy guidance is usually recommended in complex strictures. Balloon size that approximates or slightly greater than the initial diameter of the stricture could be initially chosen. If there is no evidence of bleeding or a tear, the operator can perform additional balloon dilation with a larger balloon catheter.

3. Management after Balloon Dilation

Repeated balloon dilation with a 2 week interval is recommended if dysphagia is recurred or not improved. When the persistence or recurrence of dysphagia occurs despite at least 5 dilation sessions with dilation to at least 14 mm, the condition may be defined as a refractory benign esophageal stricture (RBES) (3). A recent study showed that a significant proportion of patients with CBES who failed prior dilations done at ≥ 2-week intervals achieved dysphagia-free status by initiating weekly dilations (4). However, generally long-term outcome for RBES is poor, with only 1 of 3 achieving clinical resolution. Options for management of refractory esophageal strictures have been reported include endoscopic incisional therapy or intralesional injection of steroids or mitomycin, or placement of esophageal stents.

Esophageal Stent for Refractory Esophageal Stricture

1. Self-expandable stents

The use of self-expandable stents for refractory benign esophageal strictures can offer continuous dilatory effect, thus is a conceptually attractive treatment option. Typically, removable self-expandable stents are used, because stents cannot be placed permanently in benign esophageal strictures. Even after stent is removed, remodeling of the esophageal stricture could be retained to prevent re-stenosis. According to a meta-analysis, the rate of sustained response to stenting was 40.5%. However, a relatively higher stent migration rate (28.6%), and other adverse events due to stenting including chest pain, bleeding, and perforation occurred in 20.6% should be considered (5). Cost effectiveness also should be considered. According to a study which compared stent plus dilation versus repeated dilation in patients with anastomotic strictures after esophagectomy, patients who were stented required fewer dilations, but the cost and the complication rate was greater than those who were only treated by dilation.

2. Biodegradable stents

Biodegradable stent could be another option. Stent removal is not necessary in treatment with biodegradable stent. Recent multicenter prospective trial in Japan showed favorable efficacy and safety (6). Fourteen of thirty patients achieved dysphagia improvement until 3 months after placement. Median dysphagia-free survival was 98 days. Most adverse events could be managed conservatively except for one patient who developed an esophago-cardiac fistula.

Conclusions

Adding radiologic approach has several advantages compared to sole endoscopic approach. Serial balloon dilation is a mainstay of radiologic treatment for benign esophageal stricture. For refractory benign esophageal strictures, stenting also could be an option.

References

1. Ravich WJ. Endoscopic Management of Benign Esophageal Strictures. Curr Gastroenterol Rep. 2017;19(10):50.
2. Marom A, Davidovics Z, Bdolah-Abram T, Ledder O. Endoscopic versus fluoroscopic esophageal dilatations in children with esophageal strictures: 10-year experience. Dis Esophagus. 2022.
3. Kochman ML, McClave SA, Boyce HW. The refractory and the recurrent esophageal stricture: a definition. Gastrointest Endosc. 2005;62(3):474-5.
4. Palam S, Mohorek M, Rizvi S, Dua K. Clinical outcomes on weekly endoscopic dilations as the initial approach to manage patients with complex benign esophageal strictures: report on 488 dilations. Surg Endosc. 2022.
5. Fuccio L, Hassan C, Frazzoni L, Miglio R, Repici A. Clinical outcomes following stent placement in refractory benign esophageal stricture: a systematic review and meta-analysis. Endoscopy. 2016;48(2):141-8.
6. Yano T, Yoda Y, Nonaka S, Abe S, Kawata N, Yoshio T, et al. Pivotal trial of a biodegradable stent for patients with refractory benign esophageal stricture. Esophagus. 2022;19(3):516-24.

Session 1-3

Management of patients with T1b esophageal cancer

Cheol Min Shin

Department of Internal Medicine, Seoul National University Bundang Hospital, Seongnam-si, Korea

Introduction

In this session, I would like to introduce recent advances in the treatment of T1b esophageal squamous cell carcinoma (ESCC), and in particular, examine the treatment principles for the elderly patients.

Body

1. Esophagectomy

Esophagectomy remains the mainstay of treatment for Stage I ESCC. The latest National Comprehensive Cancer Network Guideline and the European Society for Medical Oncology Clinical Practice Guidelines states that esophagectomy is the standard treatment for cT1bN0 ESCC and that definitive chemoradiotherapy (CRT) may be an appropriate option for patients who are elderly (> 75 years old) or decline surgery.

However, it is very invasive and in known to be associated with a high incidence of morbidity and mortality. Moreover, postoperative symptoms such as appetite loss, early satiety, dysphagia, aspiration, and reflux can impair the patients' quality of life.

2. Endoscopic treatment

Endoscopic resection (ER) is a less invasive treatment for early esophageal cancer than other treatment modalities such as esophagectomy and definitive CRT. The indication for ER is decided based on the risk of lymph node metastasis. Lymph node metastasis (LNM) rarely arises from carcinoma in situ (M1) or tumors confined within the lamina propria (M2); therefore, ER can be curative for these tumors. The reported incidence of LNM in patients with ESCCs invading the muscularis mucosa (M3) and those with minimal invasion to the submucosal layer (< 200 μm) was 9.3 % and 19.6 %, respectively.

From this background, recent Korean Guidelines recommend endoscopic resection as a first-line treatment for superficial ESCC (SESCC) without distant or LNM after excluding those with obvious submucosal invasion. No additional treatment is necessary after en bloc complete resection of SESCC invading no more than the lamina propria without lymphovascular invasion (LVI); since the risk of LNM in a SESCC invading into muscularis mucosa without LVI is low, a close follow-up can be recommended without additional treatment. However, in case of a tumor with submucosal invasion or LVI positive or positive vertical resection margin, additional treatment is recommended.

Adjuvant therapy includes esophagectomy or CRT; but it is unclear which treatment is better; 5-year overall survival rates are reportedly ranged 90%–100% for esophagectomy and 75%–85% for CRT. However, patients with high-risk features including poorly differentiated histology, LVI positive, perineural invasion positive, T1b-SM2/T1b-SM3 cancer, and vertical resection margin positive need to be treated with additional esophagectomy.

The evidence is still lacking on which is the best as an additional treatment after non-curative ER between esophagectomy and CRT. There has been no prospective trial on this issue. Recently, a Randomized Multicenter Noninferiority Trial Comparing Chemoradiotherapy Versus Esophagectomy After Endoscopic Submucosal Dissection for Superficial Esophageal Squamous Cell Carcinoma (ASSURE) trial has been launched. ASSURE trial compares concurrent CRT and esophagectomy after ER for ESCC. And the primary outcome is 3-year overall survival, and the secondary outcomes are 1-, 2- and 5-year overall survival, disease-free survival and quality of life and complications or adverse events related to the treatment.

3. Definite chemoradiotherapy

As mentioned above, definitive CRT can be an appropriate option for patients who decline surgery for cT1bN0 ESCC. With the advantages of organ preservation, definitive CRT has shown overall survival rates comparable to that of radical surgery for cT1N0M0 ESCC. However, the high local failure rates (19%–29%) and the complications associated with radiation dose are major limitations. Also, ER with adjuvant CRT may be a good option for cT1bN0 ESCC. That is, tumors can be removed by ER to reduce local failure rates, and doses of the subsequent CRT can be reduced to minimize the risk of complications. Previous studies comparing the outcomes of ER with adjuvant CRT with those with definite CRT showed significantly lower radiation dose, better local control, lower locoregional recurrence rate, and higher 5-year disease free survival and overall survival rates. However, these results should be interpreted with caution since the tumor depth was pathologically diagnosed in the ER group and clinically diagnosed in the definite CRT group. The results of this study need to be followed up.

4.Special consideration for the elderly patients (> 75 years old)

As non-cancer□related death is the main cause of mortality in the elderly patients with esophageal cancer, non-cancer-related prognostic factors should be considered when choosing an appropriate treatment strategy in these patients. Several studies have evaluated factors such as nutrition, comorbidity, and physical condition in attempts to predict prognosis in the patients. A recent study identified the Charlson comorbidity index (CCI) as being a significant prognostic factor in elderly patients who underwent ER for SESCC. Therefore, in elderly patients, physical condition and co-morbidities, as well as LNM or cancer-specific mortality, should be considered in determining necessity for additional treatment after non-curative ER of SESCC (Figure).

Conclusions

Although esophagectomy with lymphadenectomy has been the standard of care for SESCC, surgery-related morbidity, mortality, and impaired quality of life have consistently been a major problem. In contrast, endoscopic resection (ER) is a minimally invasive therapy that is gaining an acceptable alternative treatment option for SESCC. ER combined with adjuvant therapy appears to be a new treatment option for cT1N0M0 ESCC invading to deep mucosa (pT1a-M3) with LVI or submucosa (pT1b). Adjuvant esophagectomy should be the treatment modality for patients with high-risk of recurrence.

When considering the treatment for cT1b ESCC, achieving a "cure" of the tumor should be regarded as the most important goal. However, as the main cause of mortality in the elderly patients is non-cancer-related death, not only achieving a "cure" and also a good quality of "care" is important in the management of these patients.

References

1. Shin CM. Treatment of Superficial Esophageal Cancer: An Update. Korean J Gastroenterol 2021;78:313-319. [Korean]
2. Tsou YK, Lee CH, Le PH, Chen BH. Adjuvant therapy for pT1a-m3/pT1b esophageal squamous cell carcinoma after endoscopic resection: esophagectomy or chemoradiotherapy? A critical review. Crit Rev Oncol Hematol 2020;147:102883.
3. Hatta W, Gotoda T, Koike T, Masamune A. Management following endoscopic resection in elderly patients with early-stage upper gastrointestinal neoplasia. Dig Endosc 2020;32:861-873.
4. Park CH, Yang DH, Kim JW, et al. Clinical practice guideline for endoscopic resection of early gastrointestinal cancer. Korean J Gastroenterol 2020;75:264-291.
5. Nakajo K, Abe S, Oda I, et al. Impact of the Charlson comorbidity index on the treatment strategy and survival in elderly patients after non-curative endoscopic submucosal dissection for esophageal squamous cell carcinoma: a multicenter retrospective study. J Gastroenterol 2019;54:871-880.

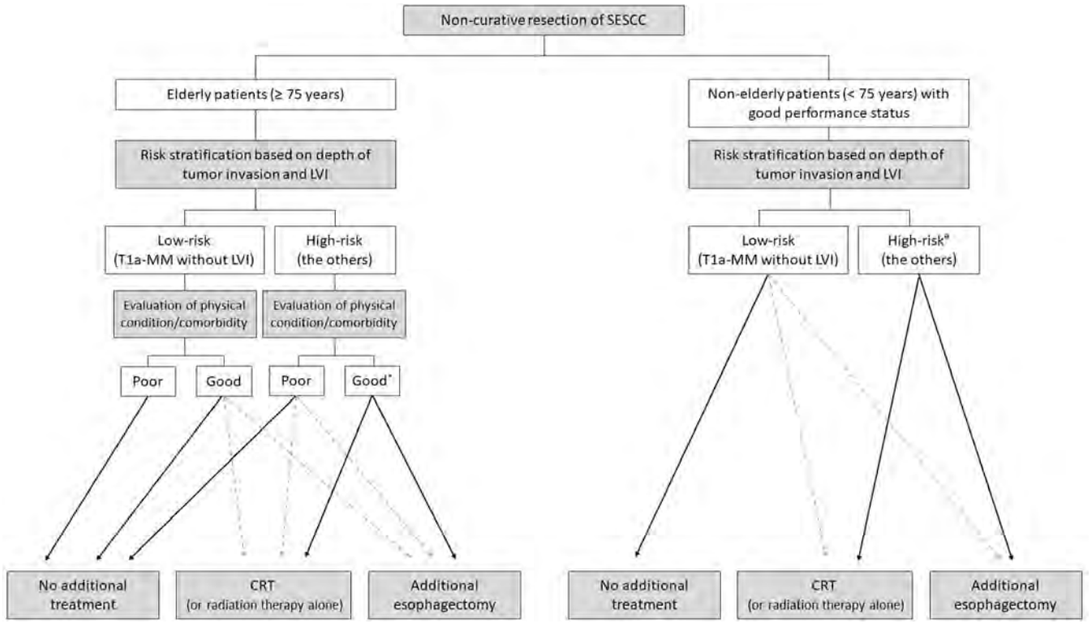


Figure.

Determining the necessity for additional treatment after a non-curative endoscopic resection of superficial esophageal squamous cell carcinoma (SESCC. Reference #1). CRT, chemoradiotherapy; LVI, lymphovascular invasion; pT1a-M3, tumor invasion into the muscularis mucosa; pT1b-SM, tumor invasion into the submucosa. aFor patients with high-risk features (poorly differentiated histology, LVI positive, perineural invasion positive, T1b-SM2/T1b-SM3 cancer, and vertical resection margin positive), additional esophagectomy is recommended first.

Session 1-4

Salvage endoscopic resection after definitive chemoradiotherapy for esophageal cancer

Peter D. Siersema

Professor of Endoscopic Gastrointestinal Oncology, Editor-in-Chief, Endoscopy
Dept. of Gastroenterology and Hepatology, Radboud University Medical Center, Nijmegen, The Netherlands

Introduction

Definitive chemoradiotherapy (CRT) is increasingly used as a nonsurgical treatment for esophageal cancer. In Japanese studies, salvage endoscopic resection (ER) has emerged as a promising strategy for local failure after definitive CRT but no results on salvage ER from Western countries are known.

Methods

Endoscopists from Europe and the United States were invited to submit their experience with salvage endoscopic submucosal dissection (ESD) or endoscopic mucosal resection (EMR) after definitive CRT. Participating endoscopists completed an anonymized database, including patient demographics, clinicopathologic variables, and follow-up on survival and recurrence.

Results

Data from 10 endoscopic centers in 6 European countries with a total of 25 patients were collected
A total of 35 salvage ER procedures were performed, of which 69% were ESD and 31% EMR.
Most patients had squamous cell carcinoma (64%) of the middle or lower esophagus (68%), staged as cT2-3 (68%) and cN+ (52%) before definitive CRT. The median time from end of definitive CRT to ER was 22 months (interquartile range, 6-47). The en-bloc resection rate was 92% for ESD and 46% for EMR. During a median of 24 months (interquartile range, 12-59) of follow-up after salvage ER, 52% developed a recurrence (11 locoregional, 2 distant). The 5-year recurrence-free survival, overall survival, and disease-specific survival were 36%, 52%, and 79%, respectively.
No major intra- or postprocedural adverse events, such as bleeding or perforation, were reported.

Conclusions

In carefully selected esophageal cancer patients, salvage ER is technically feasible after definitive
CRT. Further prospective research is recommended to validate the safety and effectivity of salvage ER for the management of local failure.

Session 2-1

Case based discussion
- How to cope with ERCP/EUS related complications: Who do you call

In Rae Cho

Department of Internal Medicine and Liver Research Institute,
Seoul National University College of Medicine, Seoul, Korea

Case #1
Age and Gender: 72 / Female

Chief complains: Epigastric pain after ERCP

Present illness: A 72-year-old female patient complained persistent epigastric pain after ERCP.

Endoscopic and Radiologic Findings: ERPD tip was located in the retroperitoneum, outside of pancreatic uncinate process. There are necrotic pancreatitis and diffuse fat necrosis associated with ERPD dislocation.

Progress: The dislocated ERPD stent was removed and conservative treatment was performed. One month after the onset of pancreatitis, abdominal pain worsened and the extent of necrosis increased. PCD insertion was performed, and necrotic fluid was drained through PCD. After several times of PCD revision for 1 month, patient's symptoms and necrosis were improved.

Case #2
Age and Gender: 68 / Female

Chief complains: Dyspnea and desaturation after ERCP

Present illness: A 68-year-old female patient complained dyspnea and showed desaturation after ERCP.

Endoscopic and Radiologic Findings: She underwent subtotal gastrectomy (Billroth-II anastomosis) due to gastric cancer. So, forward-view scope (with cap) was used for ERCP. After the selective deep cannulation to CBD and EPBD, retroperitoneal gas was suspected on the fluoroscopy.

Progress: ERCP session was terminated after ERBD stent insertion. Flumazenil was administered and oxygen mask was applied immediately. However, desaturation status was continued, so tracheal intubation was performed. On the CT scan, massive pneumoretroperitoneum, pneumomediastinum and pneumothorax was noted. Chest tube was inserted and conservative treatment including IV antibiotics and total parenteral nutrition was performed. Thereafter, the patient resumed oral diet 2 weeks later, and was discharged after 4 weeks.

Session 2-2

ERCP/EUS related complications - Bleeding, perforation

Kenneth F. Binmoeller

Chief, Division of Advanced Interventional Endoscopy
California Pacific Medical Center
San Francisco, CA. USA

ERCP - Perforation
Perforation during ERCP can occur by several mechanisms: (1) luminal perforation by the endoscope, typically resulting in intraperitoneal perforation; (2) extension of a sphincterotomy incision beyond the intramural segment of the bile duct or pancreatic duct with retroperitoneal leakage; and (3) extramural passage of guidewires or migration of stents. The most frequent cause of perforation is sphincterotomy, precut sphincterotomy, or sphincteroplasty resulting in periampullary perforations of the medial wall of the duodenum (Stapfer type II). If unrecognized or untreated in a timely manner, perforation may result in high morbidity and mortality.

The decision whether to pursue conservative versus upfront surgical management is usually dictated by clinical presentation and course, any remaining pathology, and patient risk factors for surgery. Conservative management has historically consisted of close monitoring with options to divert gastric, duodenal, and biliary fluid through nasogastric tubes, naso-duodenal tubes, and naso-biliary tubes, respectively. An argument for upfront surgical management has been high mortality if surgery is delayed. A systematic review of 11 studies showed that after initial nonsurgical management, surgery was needed in 29/137 (21%) of patients with Stapfer type II perforation with a mortality of 38%. [Vezakis, World J Gastrointest Endosc 2015]. However, significant advances in endoscopic treatment of perforation argue for an initial attempt at endoscopic treatment. Novel clips are available to directly close perforations and fully covered self-expanding metal stents to seal off perforations can reduce if not eliminating the need for surgery.

ERCP – Bleeding
Bleeding with ERCP is most commonly the result of endoscopic sphincterotomy, but may also occur after stricture dilation, intraductal biopsy, and ablative therapies. Severity is gauged by the requirement of blood transfusion or angiographic therapy and considered severe if it requires surgical intervention, results in prolonged hospital stay (>10 days), or prolonged intensive care unit stay (>1 day). While coagulopathy and peri-procedural anticoagulant therapy are significant risk factors for post-ERCP bleeding, the peri-procedural intake of aspirin or NSAIDs has not been found to increase the risk of bleeding. Other reported risk factors include active cholangitis, endoscopist case volume <1 per week, any observed bleeding during the procedure, cirrhosis, periampullary diverticulum, stone impaction, ampullary tumor, and extension of previous sphincterotomy [Shah, N Engl J Med 1996].

We reported the first series using biliary SEMSs to control bleeding after sphincterotomy. The mechanical tamponade effect is similar to that of a covered esophageal SEMSs to achieve hemostasis for variceal bleeding [Shah, GIE 2010].

EUS - Perforation
Luminal perforation associated with routine EUS is a rare occurrence. Both radial and CLA echoendoscope transducers have a larger diameter compared to diagnostic endoscopes and have a rigid transducer distal to the optics along with a nonflexible segment just proximal to the US transducer. The optics for the curved linear array echoendoscope are oblique viewing, akin to a duodenoscope. Thus, intubation and advancement of the instruments are semi-blind maneuvers. Esophageal perforation is most common, but the duodenum

is also at particular risk for perforation due to a sharp angulation between the bulb and second duodenum and a thin bowel wall.

Strictures encountered in the GI tract may result in perforation during attempted passage with echoendoscope. This is most common encountered in the esophagus due to a narrower lumen. Preliminary endoscopy-guided dilation with bougies or balloons may enable subsequent passage of the echoendoscope, but aggressive dilation is usually needed and itself carries a risk of perforation, reported in up to 24% of cases [Van Dam et al, Cancer 1993]. To enable safe EUS staging in patients with malignant strictures Binmoeller reported on the use of a monorail wire-guided, tapered tip, nonoptical echoendoscope with 9.8mm diameter [Binmoeller, Gastrointest Endosc 1995]. Through-the-scope US probes represent another alternative, but have limited depth of penetration for TNM staging.

EUS-guided drainage procedures include drainage of pancreatic fluid collections, the bile duct and gallbladder, and enteric drainage by gastro-enterostomy or entero-enterostomy. By definition, EUS-guided transmural drainage creates a controlled perforation of 2 walls. Using the Seldinger technique, leak can occur during removal of an instrument over-the-wire, as this leaves a step-off between the wire and tract. Insertion of an instrument over-the-wire and tract dilation can result in separation of the target and bowel lumens with frank perforation. A step-off between stent and tract diameter may also result in leak. The author developed the electrocautery-enhanced delivery system to enable access to the target lumen with a stent-loaded delivery catheter followed by immediate deployment of the LAMS, thus eliminating over-the-wire exchange [Binmoeller, Gastrointest Endosc Clin N Am. 2018;
Binmoeller GIE, 2020]. The delivery catheter seals off the puncture tract until LAMS deployment.

EUS - Bleeding

Interventional EUS traverses the GI lumen to enter target structures and organ, often in close proximity to large vascular structures. Bleeding can occur into the GI lumen, intra- or retro-peritoneally, and into the target organ or structure. Bleeding can present during or immediately after the procedure, or in a delayed fashion.

Bleeding after tissue sampling

Apart from aggressive sampling using large bore coring needles, bleeding is rarely clinically significant (hemoglobin drop >2 g/dL and/or evidence of hematemesis, melena, or hematochezia). Bleeding after EUS-FNA or FNB in one study of over 1600 patients was reported to be 0.18% [Marchetti et al, Scand J Gastroenterol. 2020]. The risk of bleeding after pancreatic cyst FNA was reported to be 6% in one study, but was self-limiting in all [Varadarajulu, GIE 2004]

Bleeding during and after transmural drainage

Bleeding during transmural drainage can occur upon puncture or after tract dilation. The use of fully covered SEMS or LAMS controls bleeding due to a tamponade effect. Delayed bleeding after LAMS placement, however, has been reported in numerous studies. In patients undergoing endoscopic drainage for walled-off pancreatic necroses, a randomized trial found bleeding to be more commonly encountered after LAMS insertion compared with plastic stent insertion (9.7% in the LAMS group compared with 3.4% in the plastic stent group, Bang, Gut. 2019]. It is hypothesized that the stiff, immobile nature of LAMS, in contrast to flexible, mobile plastic stents, promotes tissue and vascular erosion and impingement upon the WON as the cavity collapses. It remains to be determined whether placement of a double pigtail plastic stent inside a LAMS will protect against delayed bleeding. LAMS-related bleeding all occurred beyond 3 weeks after placement and has prompted current recommendations that imaging with LAMS removal or exchange be performed at 3 weeks.

1. References

2. Vezakis et al, Endoscopic retrograde cholangiopancreatography- related perforations: Diagnosis and management. World J Gastrointest Endosc 2015; 7: 1135 – 1141
3. Shah .. Binmoeller et al. Temporary self-expandable metal stent placement for treatment of post-sphincterotomy bleeding. Gastrointest Endosc. 2010 Dec;72(6):1274-8
4. Shah et al. Complications of endoscopic biliary sphincterotomy. N Engl J Med 1996;335:909-18
5. Binmoeller et al. Ultrasonic esophagoprobe for TNM staging of highly stenosing esophageal carcinoma. Gastrointest Endosc. 1995 Jun;41(6):547-52
6. Marchetti et al. Adverse events and mortality: comparative analysis between diagnostic and interventional endoscopic ultrasound. Scand J Gastroenterol. 2020 Aug;55(8):995-1001
7. Binmoeller et al. The Evolution of Endoscopic Cystgastrostomy. Gastrointest Endosc Clin N Am. 2018 Apr;28(2):143-156
8. Binmoeller et al, Design considerations of the AXIOS stent and electrocautery enhanced delivery system,
9. Techniques and Innovations in Gastrointestinal Endoscopy, 2020 Jan 22 (1): 3-8
10. Lyu et al.Comparison between lumen-apposing metal stents and plastic stents in endoscopic ultrasound-guided drainage of pancreatic fluid collection: a meta-analysis and systematic review.Pancreas. 2021; 50: 571-578
11. Bang et al.Non-superiority of lumen-apposing metal stents over plastic stents for drainage of walled-off necrosis in a randomised trial.Gut. 2019; 68: 1200-1209

Session 2-3

ERCP/EUS related complications-post ERCP pancreatitis

Sajjad Mahmood

Consultant Gastroenterologist with special interest in Hepato-Pancreato-Biliary (HPB) diseases and advanced endoscopy, Manchester University NHS Foundation Trust, UK

Educational Background

2000 MBBS, Allama Iqbal Medical College Lahore, Pakistan
2014 Certificate of specialist training (CCT) in gastroenterology and GIM, UK
2014-2015 Post CCT Fellowship in HPB/Advanced endoscopy, University Hospital of South Manchester

Professional Career

Dr Mahmood is working as Consultant Gastroenterologist with special interest in Hepato-Pancreato-Biliary (HPB) diseases and advanced endoscopy in Manchester University NHS foundation Trust/Wythenshawe hospital. This unit provides tertiary level service in greater Manchester including complex ERCP, complex hilar work, advanced interventional EUS with drainage of pancreatic collections, EUS choledochoduodenostomy, EUS gallbladder drainage, EUS hepaticogastrostomy and EUS directed transgastric ERCP in patients with gastric bypass.

Dr Mahmood has been clinical lead for Hepato-Pancreatico-Biliary (HPB) medicine during 2016 for Pennine Acute Hospitals, UK. He is a member of Gastro Specialty training and education committee (STEC) for north west region of UK and Trust Specialty Training Lead (TSTL).

Dr Mahmood delivered Hepatology and HPB curriculum in his capacity of curriculum lead for North west gastroenterology trainees for the year 2019-2020 and initiated first online teaching day during the early part of Covid pandemic. He is actively involved in teaching and supervising medical students and trainee doctors.
He has been a faculty member for multiple upper/lower GI, EUS/ERCP teaching courses.
During his specialist gastroenterology training Dr Mahmood was Specialty training and education committee (STEC) representative for Merseyside gastro trainees for 3 years. He was also Associate royal college tutor for a year.

Research Field

- HPB/advanced endoscopy

Session 2-4

Surgical management for ERCP/EUS related complications

Mariano E. Giménez

University of Buenos Aires, Argentina

Summary

- Physician. School of Medicine. University of Buenos Aires. Argentina.
- Doctor in Medicine. Thesis grade: “Outstanding”. School of Medicine. University of Buenos Aires.
- Full Professor of Surgery. School of Medicine. University of Buenos Aires.
- Chair of Excellence in Percutaneous Surgery, Institute for Advanced Studies, University of Strasbourg, France
- Visiting Professor. Postgraduate Degree in Interventional Radiology. University of Zaragoza, Spain.
- Visiting Professor. Surgery and Radiology. School of Medicine. University of Louisiana, USA.
- Visiting Professor. Surgery. School of Medicine. University of Asunción, Paraguay.
- Visiting Professor. Surgery. School of Medicine. Universidad del Este, Paraguay.
- Scientific Director Percutaneous Surgery. IHU-Ircad. Strasbourg. France.
- Director - Chair of General Surgery and Minimal Invasive Surgery “Taquini”. University of Buenos Aires. Argentina
- Director of the University Diploma in Gastroenterological Surgery at the University of Buenos Aires.
- President of DAICIM Foundation, dedicated to Teaching, Treatment and Research into Interventional Radiology and Minimally Invasive Surgery.
- Treasurer of AHPBA (American Hepato-Pancreato-Biliary Association).
- FSIR. Fellow of SIR (American Society of Interventional Radiology)
- Specialist in General Surgery, granted by the Argentine Association of Surgery, the Ministry of Health of the Nation and the Medical College of the Province of Buenos Aires
- Specialist in Coloproctology, awarded by the Argentine Society of Coloproctology, the Argentine School of Coloproctology and the Graduate School of the Argentine Medical Association.
- Past Director of the University Centre for practice, teaching and research into Minimally Invasive Surgery. School of Medicine. University of Buenos Aires.
- Past Chief – Division of Gastroenterology Surgery at Clínicas University Hospital. University of Buenos Aires.
- Past General Secretary of School of Medicine. University of Buenos Aires.
- Past General Secretary of Asociación Argentina de Cirugía.
- Former President of the Iberian-American Society of Interventionism. (SIDI)
- Past Chair of International Relation Committee, AHPBA.
- Over 1,000 lectures given and surgery activities run for post graduate participants in 32 countries.
- Directed or coordinated over 350 scientific events in Argentina and abroad.
- Presented or published over 200 scientific papers in Argentina and abroad.
- Thirteen awards, including "Prize School of Medical Sciences 1996" Best Thesis of the year. University of Buenos Aires
- Over 100 book chapters authored or books co-authored in Argentina and abroad.

Session 2-5

Interventional radiologic approaches for ERCP/EUS related complications

Myungsu Lee

Department of Radiology, Seoul National University Hospital, Korea

Interventional radiologists have a key role in the management of patients with biliary disease. Fundamental of interventional radiologic procedure in biliary disease is percutaneous transhepatic biliary drainage (PTBD). Along with endoscopic retrograde cholangiopancreatography (ERCP) based procedures, PTBD provides access to bile duct for various procedures including duct dilation, stenting and stone removal. Also, interventional radiologic procedures in biliary fields include drain of abscess or complicated fluid, and vascular embolization.

Endoscopic and transhepatic approach have different characteristic in the aspect of the risk of complication. Compared to ERCP, PTBD is known to have higher risk of access-related hemorrhage and bile leak. On the contrary, ERCP have higher risk of pancreatitis, infection and bowel injury. PTBD may result in 1.9% – 2.3% incidence of severe hemorrhage, often defined by the necessity of transfusion or of additional endovascular or surgical intervention (1-3). Interventional radiologists may control the vessel injury by the means of transarterial embolization in majority of the cases. Hemorrhagic complication following ERCP has reported incidence of 0.3% - 2.0% (4-8), seems similar to that of PTBD, however 71% - 78% of the cases are not categorized as severe hemorrhage (4, 6, 7), which means ERCP is safer than PTBD in the aspect of hemorrhagic complication. Main concern of hemorrhage during or after ERCP is related to the sphincterotomy. When the procedures by endoscopic approach fail to achieve hemostasis, endoscopists may refer the patient to interventional radiologists or surgeons for further management. Transarterial embolization can be applied in such cases like PTBD-related arterial injuries. Case series reports with small number of patients in the application of transarterial embolization for sphincterotomy-related hemorrhage showed favorable outcome with less than 10% rebleed which needs hemostasis by other modalities (9-11). Guidelines by American Society for Gastrointestinal Endoscopy (ASGE) suggested that transarterial embolization is as effective as surgery and should be considered before surgery in the management of distal bleeding that is refractory to endoscopic hemostasis (12).

The ASGE guidelines also suggested the application of transarterial embolization in the cases with bleeding originating from above the hilum, not related to the sphincterotomy. Unlike distal bleeding which has more straightforward mechanism of sphincterotomy, the suprahilar bleeding may have various mechanism such as vessel erosion by stent or catheter, tissue injury directly by balloon dilation procedure, penetration of vessels by guidewire manipulation, or direct invasion of vessels by tumors. However, the embolization procedures in the proximal hepatic artery segments may result in ischemic complications. Potential intrahepatic arterial collateral formation and dual blood supply to the liver by portal vein have protective effect in the development of ischemic complications including parenchymal infarct, abscess or biloma formation, and bile duct necrosis. As a result, embolization procedures at the peripheral segment of hepatic arteries after injury is often well-tolerated. In a such report on the hepatic artery embolization for PTBD-related injury showed high incidence of 81% hepatic ischemia or focal infarct after the procedure but the patients recovered in days (2). In a report concerning more proximal hepatic artery injury after pancreaticoduodenectomy, about a half of the patients had ischemic complications after the embolization procedure and about a third of the patients with the complications expired by liver failure (13). Concerning the location of injury in suprahilar area is more proximal than the cases with PTBD and more distal than the cases with pancreaticoduodenectomy, commonly around right hepatic artery, the severity of ischemia after embolization probably lies somewhere between the cases with PTBD and pancreaticoduodenectomy. Dedicated reports on the suprahilar arterial embolization related to ERCP-based procedure is rare so far.

In summary, the interventional radiologic procedures are the primary options in the minimally invasive management of biliary diseases, along with endoscopic procedures. The transarterial embolization is as effective as surgery for ERCP-related hemorrhagic complications and is less invasive. In the application of embolization procedures for suprahilar bleeding, the possibility of ischemic injury in the liver and bile ducts should be kept in mind.

References

1. L'Hermine C, Ernst O, Delemazure O, Sergent G. Arterial complications of percutaneous transhepatic biliary drainage. Cardiovasc Intervent Radiol. 1996;19(3):160-4.
2. Choi SH, Gwon DI, Ko GY, Sung KB, Yoon HK, Shin JH, et al. Hepatic arterial injuries in 3110 patients following percutaneous transhepatic biliary drainage. Radiology. 2011;261(3):969-75.
3. Hamada T, Yasunaga H, Nakai Y, Isayama H, Horiguchi H, Fushimi K, et al. Severe bleeding after percutaneous transhepatic drainage of the biliary system: effect of antithrombotic agents--analysis of 34 606 cases from a Japanese nationwide administrative database. Radiology. 2015;274(2):605-13.
4. Freeman ML, Nelson DB, Sherman S, Haber GB, Herman ME, Dorsher PJ, et al. Complications of endoscopic biliary sphincterotomy. N Engl J Med. 1996;335(13):909-18.
5. Loperfido S, Angelini G, Benedetti G, Chilovi F, Costan F, De Berardinis F, et al. Major early complications from diagnostic and therapeutic ERCP: a prospective multicenter study. Gastrointest Endosc. 1998;48(1):1-10.
6. Andriulli A, Loperfido S, Napolitano G, Niro G, Valvano MR, Spirito F, et al. Incidence rates of post-ERCP complications: a systematic survey of prospective studies. Am J Gastroenterol. 2007;102(8):1781-8.
7. Cotton PB, Garrow DA, Gallagher J, Romagnuolo J. Risk factors for complications after ERCP: a multivariate analysis of 11,497 procedures over 12 years. Gastrointest Endosc. 2009;70(1):80-8.
8. Alomari M, Al Momani L, Alomari A, Khazaaleh S, Hitawala AA, Khasawneh A, et al. The Incidence of Endoscopic Retrograde Cholangiopancreatography-Related Complications in Patients With Liver Transplant: A Meta-Analysis and Systematic Review. Gastroenterology Res. 2021;14(5):259-67.
9. So YH, Choi YH, Chung JW, Jae HJ, Song SY, Park JH. Selective embolization for post-endoscopic sphincterotomy bleeding: technical aspects and clinical efficacy. Korean J Radiol. 2012;13(1):73-81.
10. Dunne R, McCarthy E, Joyce E, McEniff N, Guiney M, Ryan JM, et al. Post-endoscopic biliary sphincterotomy bleeding: an interventional radiology approach. Acta Radiol. 2013;54(10):1159-64.
11. Maleux G, Bielen J, Laenen A, Heye S, Vaninbroukx J, Laleman W, et al. Embolization of post-biliary sphincterotomy bleeding refractory to medical and endoscopic therapy: technical results, clinical efficacy and predictors of outcome. Eur Radiol. 2014;24(11):2779-86.
12. Committee ASoP, Chandrasekhara V, Khashab MA, Muthusamy VR, Acosta RD, Agrawal D, et al. Adverse events associated with ERCP. Gastrointest Endosc. 2017;85(1):32-47.
13. You Y, Choi SH, Choi DW, Heo JS, Han IW, Han S, et al. Long-term clinical outcomes after endovascular management of ruptured pseudoaneurysm in patients undergoing pancreaticoduodenectomy. Ann Surg Treat Res. 2019;96(5):237-49.

Session 3-1

Imaging diagnosis of the pancreatic cystic lesions

Jae Seok Bae

Department of Radiology, Seoul National University, Korea

Introduction

The incidence of pancreatic cystic lesion (PCL) is increasing due to the advances in imaging technology. It has been reported that PCL is found in 1.2–2.6% of abdominal CT examinations and 13.5–19.9% of MRI examinations. The accurate diagnosis of PCL is important because the risk of malignancy varies according to the type of PCL. Currently, ultrasound, CT, and MRI are widely used for the evaluation of PCLs. Among them, cross-sectional imaging modalities including CT and MRI are useful and reliable for the diagnosis and follow-up of PCLs.

Classification of PCL

PCL can be classified into nontumorous condition such as pseudocyst or walled-off necrosis (WON), cystic neoplasm including serous cystadenoma (SCA), intraductal papillary mucinous neoplasm (IPMN), mucious cystic neoplasm (MCN), or lymphangioma, and cystic degeneration of solid tumor such as solid pseudopapillary tumor or neuroendocrine tumor. The estimated prevalence are 30% for pseudocyst or WON, 20% for SCA, 20% for IPMN, 10% for MCN, and 15% for cystic degeneration of solid tumor.

1. Pseudocyst or walled-off necrosis

The first step in the differential diagnosis of PCL is to determine whether it is tumorous condition or nontumorous condition. Nontumorous condition can be followed up or treated with conservative management including drainage. Pseudocyst refers to an encapsulation of fluid collection without necrosis by well-defined inflammatory wall, whereas WON refers to an encapsulated, mature necrosis of pancreatic parenchyma and/or peripancreatic tissue. As both pseudocyst and WON are disease entities encapsulated by inflammatory wall, history taking or correlation with laboratory examinations such as serum amylase or lipase are required to exclude the possibility of pancreatitis. However, rupture IPMN or an underlying malignancy should be considered in case of continuous growth in size or aggravation of symptoms.

2. Serous cystadenoma

Pathologically, SCA is a benign pancreatic neoplasm consists of small cystic cavities filled with clear, serous fluid and lined with cuboidal epithelial cells containing glycogen. The epithelial lining usually consists of single layers, but there can be cellular overlap or pseudostratification. There is vascular collagenous or hyalinized stroma between each cystic cavities and intracystic hemorrhage is not infrequent. SCA commonly occurs in the pancreas head or tail portion, while less presents in the body portion.

There are different types of SCA (Table 1). Microcystic SCA is the most common form and manifests as numerous microcysts of 1–20 mm arranged as sponge-like or honeycomb form. A central scar with calcification is the characteristic feature of microcystic SCA, but the frequency is not high (20%). On contrast-enhanced CT, a microcystic SCA has a lobulated outer margin and can enhance well due to capillary-rich stroma that may mimic a solid hypervascular tumor such as neuroendocrine tumor. On T2-weighted imaging of MRI, microcysts demonstrates bright high signal intensity due to internal fluid that could differentiate SCA from solid tumors. Central scar shows persistent enhancement on contrast-enhanced CT or MRI.

It may be difficult to differentiate oligocystic variant of SCA from MCN or IPMN. Although some imaging features including multicystic form rather than septation or fewer number of clubbed finger-like cyst have been reported to favor SCA over MCN or IPMN, it is recommended to follow up the PCLs considering the uncertainty in the imaging diagnosis.

Von-Hippel-Lindau (VHL) disease is a rare autosomal dominant disorder characterized by retinal angioma and hemangioblastoma in central nervous system. In addition, renal cell carcinoma, pheochromocarcinoma, pancreatic endocrine tumor as well as benign tumors in the liver, lung, spleen, epididymis, adrenal gland, sympathetic ganglia, kidney, omentum, mesentery, and pancreas are frequently discovered in patients with VHL disease. In particular, PCL (mostly SCA) is detected in 60–80% of patients with VHL disease and precedes hemangioblastoms in the central nervous system.

3. Mucinous cystic neoplasm

MCN is considered a premaligmant cystic tumor that should be surgically resected. MCN accounts for approximately 10% of PCL and less frequently accompanies obstructive jaundice as it usually occurs in the body and tail of the pancreas. MCN is common in middle-aged women. Pathologically, ovarian stroma is required to establish the diagnosis of MCN.

MCN manifests as a large unilocular or multilocular macrocystic lesion and can show mural nodules. Unlike central calcification in SCA, calcification in MCN tends to be found in the wall or septum in 10%. MCN has no communication to the main pancreatic duct, and its cystic content may show variable signal intensity due to the presence of proteinaceous material and/or hemorrhage. Septa or mural nodules can be well delineated on MRI, and mural nodules appear as filling defects on T2-weighted imaging. Malignant MCN may demonstrate direct invasion to the retroperitoneum or metastasis to lymph node or liver.

4. Intraductal papillary mucinous neoplasm

IPMN is classified as a premalignant lesion of low malignant potential characterized by focal or diffuse dilatation of main or branch pancreatic duct by hypersecretion of mucin and papillary proliferation of ductal epithelium. IPMN frequently discovered in old men and commonly occurs in the head and uncinated process of the pancreas.

Pathologically, IPMN is classified into IPMN with low-, intermediate-, high- grade dysplasia, or associated invasive carcinoma. IPMN can also be classified into main duct type, branch duct type, and combined type according to the level of involved duct. Patients with IPMN commonly have symptoms of obstructive jaundice or pancreatitis caused by mucin.

Branch duct type IPMN frequently occurs in the uncinate process of the pancreas and appears as a unilocular cyst or grape cluster shape multilocular cystic lesion. Branch duct type IPMN is elongated or clubbed finger-like shape rather than spherical shape. Normal intervening pancreatic parenchyma between cysts is helpful to differentiate branch duct type IPMN from other PCLs.

Communication with pancreatic duct is the most useful diagnostic feature; however, pseudocyst should be ruled out in the presence of pancreatitis. Opacification of the cystic lesion on ERCP or mucin spillage from ampulla of Vater can establish the diagnosis of IPMN.

Malignant transformation of IPMN has been reported in 14–60%: obstructive jaundice in a patient having IPMN at the pancreas head, an enhancing mural nodule ≥ 5 mm, and main pancreatic duct ≥ 10 mm are suggestive imaging features that warrant surgery. Further workup algorithm is presented in Figure 1.

Conclusion

The differential diagnosis of PCL is important to predict prognosis and determine treatment methods. There are characteristic imaging features for major PCLs including pseudocyst or WON, SCA, IPMN, or MCN. Cross-sectional imaging modality such as CT or MRI plays a pivotal role in the characterization of PCLs.

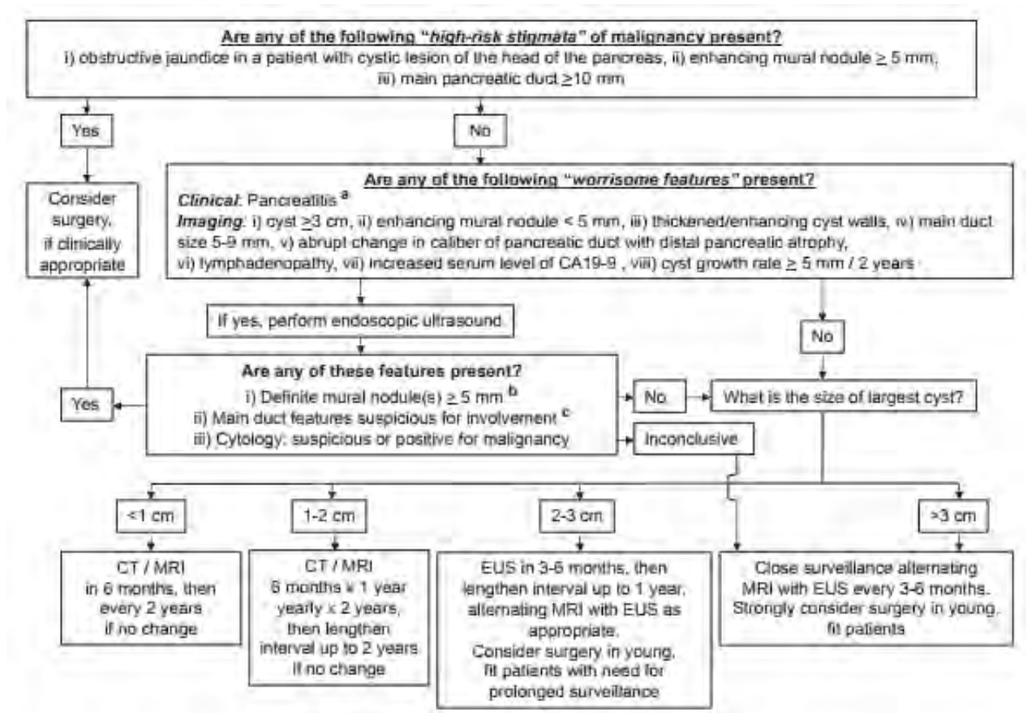
References

1. Lim, J.H., G. Lee, and Y.L. Oh, Radiologic Spectrum of Intraductal Papillary Mucinous Tumor of the Pancreas 1. Radiographics, 2001. 21(2): p. 323-337.
2. Spinelli, K.S., et al., Cystic pancreatic neoplasms: observe or operate. Annals of surgery, 2004. 239(5): p. 651-659.
3. Zhang, X.M., et al., Pancreatic cysts: depiction on single-shot fast spin-echo MR images. Radiology, 2002. 223(2): p. 547-53.
4. Lee, K.S., et al., Prevalence of incidental pancreatic cysts in the adult population on MR imaging. Am J Gastroenterol, 2010. 105(9): p. 2079-84.
5. Laffan, T.A., et al., Prevalence of unsuspected pancreatic cysts on MDCT. AJR Am J Roentgenol, 2008. 191(3): p. 802.
6. Kimura, W., et al., Analysis of small cystic lesions of the pancreas. Int J Pancreatol, 1995. 18(3): p. 197-206.
7. de Jong, K., M.J. Bruno, and P. Fockens, Epidemiology, diagnosis, and management of cystic lesions of the pancreas. Gastroenterol Res Pract, 2012. 2012: p. 147465.
8. \Thoeni, R.F., The revised Atlanta classification of acute pancreatitis: its importance for the radiologist and its effect on treatment. Radiology, 2012. 262(3): p. 751-764.
9. Engelbrecht, M., J. Bradshaw, and R. Smithuis, Pancreatic Cystic Lesions-Diagnosis and management. Radiology assistant, 2012.
10. Berland, L.L., et al., Managing incidental findings on abdominal CT: white paper of the ACR incidental findings committee. Journal of the American College of Radiology, 2010. 7(10): p. 754-773.
11. Tanaka, M., et al., Revisions of international consensus Fukuoka guidelines for the management of IPMN of the pancreas. Pancreatology, 2017. 17(5): p. 738-753.
12. Tseng, J.F., et al., Serous cystadenoma of the pancreas: tumor growth rates and recommendations for treatment. Ann Surg, 2005. 242(3): p. 413-9; discussion 419-21.
13. Wargo, J.A., C. Fernandez-del-Castillo, and A.L. Warshaw, Management of pancreatic serous cystadenomas. Adv Surg, 2009. 43: p. 23-34.
14. Compagno, J. and J.E. Oertel, Microcystic adenomas of the pancreas (glycogen-rich cystadenomas): a clinicopathologic study of 34 cases. American journal of clinical pathology, 1978. 69(3): p. 289-298.
15. Itai, Y., et al., Microcystic adenoma of the pancreas: spectrum of computed tomographic findings. Journal of computer assisted tomography, 1988. 12(5): p. 797-803.
16. Reese, S.A., et al., Solid serous adenoma of the pancreas: a rare variant within the family of pancreatic serous cystic neoplasms. Pancreas, 2006. 33(1): p. 96-99.
17. Perez-Ordonez, B., et al., Solid serous adenoma of the pancreas: the solid variant of serous cystadenoma? The American journal of surgical pathology, 1996. 20(11): p. 1401-1405.
18. Gabata, T., et al., Solid serous cystadenoma of the pancreas: MR imaging with pathologic correlation. Abdominal imaging, 2005. 30(5): p. 605-609.
19. Sahani, D., et al., Cystic pancreatic neoplasms evaluation by CT and magnetic resonance cholangiopancreatography. Gastrointest Endosc Clin N Am, 2002. 12(4): p. 657-72.
20. Compton, C.C., Histology of cystic tumors of the pancreas. Gastrointestinal endoscopy clinics of North America, 2002. 12(4): p. 673-696.
21. La Yun, B., et al., Added value of multiplanar reformations to axial multi-detector row computed tomographic images for the differentiation of macrocystic pancreas neoplasms: receiver operating characteristic analysis. Journal of computer assisted tomography, 2010. 34(6): p. 899-906.
22. Kim, S.Y., et al., Macrocystic neoplasms of the pancreas: CT differentiation of serous oligocystic adenoma from mucinous cystadenoma and intraductal papillary mucinous tumor. American Journal of Roentgenology, 2006. 187(5): p. 1192-1198.
23. Zamboni, G., et al., Mucinous cystic tumors of the pancreas: clinicopathological features, prognosis, and relationship to other mucinous cystic tumors. The American journal of surgical pathology, 1999. 23(4): p. 410-422.
24. Sakorafas, G.H., et al., Primary pancreatic cystic neoplasms revisited: part II. Mucinous cystic neoplasms. Surg Oncol, 2011. 20(2): p. e93-101.
25. Johnson, C., et al., Cystic pancreatic tumors: CT and sonographic assessment. American Journal of Roentgenology, 1988. 151(6): p. 1133-1138.
26. Buetow, P.C., P. Rao, and L.D. Thompson, From the Archives of the AFIP. Mucinous cystic neoplasms of the pancreas: radiologic-pathologic correlation. Radiographics, 1998. 18(2): p. 433-49.
27. Minami, M., et al., Cystic neoplasms of the pancreas: comparison of MR imaging with CT. Radiology, 1989. 171(1): p. 53-56.

Table 1. Five different subtypes of serous cystadenoma in order of frequency

Subtype of SCA	Predilection	Characteristics
Serous microcystic adenoma	Women	Honey comb with central scar
Serous oligocystic adenoma	Men	Head, no scar
Von Hippel Lindau-associated cystic neoplasm	None	Multifocal
Solid serous cystadenoma	Too rare	Solid but cytologically identical
Serous cystadenocarcinoma	Too rare	Mets have benign SCA cytology

Figure 1. Revisions of international consensus Fukuoka guidelines for the management of IPMN of the pancreas (Pancreatology. 2017 Sep-Oct;17(5):738-753.)



Session 3-2

EUS-guided diagnosis of pancreatic cystic neoplasm

Eun Ji Shin

Associate Professor of Medicine, The Johns Hopkins University School of Medicine, USA

Educational Background

1993-1997	B.A., Biology, Harvard University, Cambridge, MA; graduated summa cum laude
1997-2001	M.D., Medicine, Duke University School of Medicine, Durham, NC
2006-2014	Ph.D., Graduate Training Program in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Professional Career

- Residency, Internal Medicine, Johns Hopkins Hospital, Baltimore, MD
- Fellowship, Gastroenterology and Hepatology, Johns Hopkins Hospital, Baltimore, MD
- Fellowship, Advanced Therapeutic Endoscopy, Johns Hopkins Hospital, Baltimore, MD

Research Field

- GI oncology, Barrett's esophagus, pancreatobiliary disease, and therapeutic endoscopy

Session 3-3

Endoscopic ultrasound-guided cyst ablation

Sang Hyub Lee

Department of Internal Medicine, Seoul National University Hospital, Seoul National University College of Medicine, Seoul, Korea

Introduction

The decision of the appropriate treatment for pancreatic cystic lesions (PCLs) is becoming increasingly important as the number of incidentally found pancreatic cystic lesions (PCLs) increases. A range of modalities have been attempted because there has been an increasing demand for minimally invasive treatment for PCLs due to the large burden of a surgical resection. The use of Endoscopic ultrasound (EUS)-guided cyst ablation has been used in treatment of PCLs as a representative of minimally invasive therapy.

EUS -guided cyst ablation

EUS-guided ablation procedures are emerging as a minimally invasive therapeutic methods for unmet needs in dichotomous treatment policy for PCLs. A number of studies reported the feasibility and efficacy of these treatments; the most common is EUS-guided ablation for PCLS with ethanol alone or in combination with anticancer drugs. Recently, large long-term follow-up observational studies have been reported on the long-term efficacy of EUS-guided ablation for PCLS with ethanol or in combination with anticancer drugs. However, the effectiveness of EUS-guided ablation with ethanol or anticancer drugs is not clearly proved in well designed and comparative studies, so further study for the actual treatment effects or real clinical benefit would be needed. To improve the safety of ablative procedures, the results of studies on risk factors for post-procedural adverse events are considered to set appropriate indications for these procedure.

Conclusion

The use of EUS -guided cyst ablation of PCLs is expected to make much progress in the future.

References

1. Stark A, Donahue TR, Reber HA, Hines OJ. Pancreatic Cyst Disease: A Review. JAMA 2016;315:1882-1893.
2. Lesions: The Accuracy of Endoscopic Ultrasound and Cross-Sectional Imaging. Pancreas 2015;44:1329-1333.
3. Oh HC, Seo DW, Song TJ, et al. Endoscopic ultrasonography-guided ethanol lavage with paclitaxel injection treats patients with pancreatic cysts. Gastroenterology 2011;140:172-179.
4. Park JK, Song BJ, Ryu JK, et al. Clinical Outcomes of Endoscopic Ultrasonography-Guided Pancreatic Cyst Ablation. Pancreas 2016;45:889-894.
5. Choi JH, Lee SH, Choi YH, et al. Clinical outcomes of endoscopic ultrasound-guided ethanol ablation for pancreatic cystic lesions compared with the natural course: a propensity score matching analysis. Therap Adv Gastroenterol 2018;11:1756284818759929.
6. Choi JH, Lee SH, Choi YH, et al. Safety of endoscopic ultrasound-guided ethanol ablation for pancreatic cystic lesions: A single-center experience of 214 patients. Hepatobiliary Pancreat Dis Int. 2019 ;18:562-568.
7. Moyer MT, Sharzehi S, et al. The Safety and Efficacy of an Alcohol-Free Pancreatic Cyst Ablation Protocol. Gastroenterology. 2017;153:1295-1303.
8. Res Pract, 2012. 2012: p. 147465.

Session 3-4

Optimal timing and method of surgical treatment for pancreatic cyst

Mariano E. Giménez

University of Buenos Aires, Argentina

Summary

- Physician. School of Medicine. University of Buenos Aires. Argentina.
- Doctor in Medicine. Thesis grade: “Outstanding”. School of Medicine. University of Buenos Aires.
- Full Professor of Surgery. School of Medicine. University of Buenos Aires.
- Chair of Excellence in Percutaneous Surgery, Institute for Advanced Studies, University of Strasbourg, France
- Visiting Professor. Postgraduate Degree in Interventional Radiology. University of Zaragoza, Spain.
- Visiting Professor. Surgery and Radiology. School of Medicine. University of Louisiana, USA.
- Visiting Professor. Surgery. School of Medicine. University of Asunción, Paraguay.
- Visiting Professor. Surgery. School of Medicine. Universidad del Este, Paraguay.
- Scientific Director Percutaneous Surgery. IHU-Ircad. Strasbourg. France.
- Director - Chair of General Surgery and Minimal Invasive Surgery “Taquini”. University of Buenos Aires. Argentina
- Director of the University Diploma in Gastroenterological Surgery at the University of Buenos Aires.
- President of DAICIM Foundation, dedicated to Teaching, Treatment and Research into Interventional Radiology and Minimally Invasive Surgery.
- Treasurer of AHPBA (American Hepato-Pancreato-Biliary Association).
- FSIR. Fellow of SIR (American Society of Interventional Radiology)
- Specialist in General Surgery, granted by the Argentine Association of Surgery, the Ministry of Health of the Nation and the Medical College of the Province of Buenos Aires
- Specialist in Coloproctology, awarded by the Argentine Society of Coloproctology, the Argentine School of Coloproctology and the Graduate School of the Argentine Medical Association.
- Past Director of the University Centre for practice, teaching and research into Minimally Invasive Surgery. School of Medicine. University of Buenos Aires.
- Past Chief – Division of Gastroenterology Surgery at Clínicas University Hospital. University of Buenos Aires.
- Past General Secretary of School of Medicine. University of Buenos Aires.
- Past General Secretary of Asociación Argentina de Cirugía.
- Former President of the Iberian-American Society of Interventionism. (SIDI)
- Past Chair of International Relation Committee, AHPBA.
- Over 1,000 lectures given and surgery activities run for post graduate participants in 32 countries.
- Directed or coordinated over 350 scientific events in Argentina and abroad.
- Presented or published over 200 scientific papers in Argentina and abroad.
- Thirteen awards, including "Prize School of Medical Sciences 1996" Best Thesis of the year. University of Buenos Aires
- Over 100 book chapters authored or books co-authored in Argentina and abroad.

Session 4-1

Conventional endoscopic stent placement

Louis M. Wong Kee Song

Division of Gastroenterology and Hepatology, Mayo Clinic, Rochester, Minnesota, USA

Introduction

Malignant obstruction of the distal duodenum involves the 3rd – 4th portions of the duodenum, with or without extension into the proximal jejunum, and spares the biliary tree. Obstruction can result from intrinsic neoplasm or extrinsic compression/invasion, for example, from a distal pancreatic cancer or peritoneal carcinomatosis. Palliative treatment modalities include conventional endoscopic (or enteroscopic) self-expandable stent (SEMS) placement, EUS-guided gastroenterostomy (EUS-GE) with a lumen-apposing self-expandable metal stent, and surgical gastroenterostomy (Surg-GE) [1]. Endoscopic SEMS placement remains the simplest and most accessible technique for palliating a malignant distal duodenal obstruction, with the goals of relieving obstructive symptoms, resuming oral intake, and improving quality of life.

Technical Considerations

Preprocedure cross-sectional imaging can highlight multifocal areas of obstruction, as in peritoneal carcinomatosis, which negates the benefit of placing a SEMS at a single point of obstruction. Both uncovered and covered duodenal SEMS are effective at relieving obstruction. Covered SEMS that are available outside the United States are less flexible and susceptible to migration, whereas uncovered SEMS are associated with a higher risk of tumor ingrowth. Duodenal SEMSs comprise delivery catheters that can pass through a therapeutic channel upper endoscope or an adult colonoscope, and most distal duodenal obstructions can be reached by these instruments. In exceptional circumstances, an overtube-based technique can be utilized when anatomical configuration precludes reaching the obstruction even with an adult colonoscope (e.g., colonoscope looping in an extremely stretched-out, J-shaped stomach) [2].

The length of the duodenal stricture is readily determined if the endoscope can traverse the obstruction. Otherwise, fluoroscopic contrast injection aids in estimating the length of the stricture. For a high-grade stricture with near-complete obstruction and limited contrast delineation, successful cannulation of the stricture can usually be obtained using a biliary balloon-occluding catheter loaded onto a flexible hydrophilic guidewire. With the biliary occlusion balloon apposed against the orifice of the stricture, the guidewire is negotiated pass the luminal obstruction under fluoroscopic view, followed by advancement of the balloon-occluding catheter well beyond the stricture. Once passed the stricture, the flexible guidewire can be exchanged for a stiffer 0.035-inch guide wire that will serve as a rail for passage of the stent’s delivery system. Under fluoroscopic imaging, contrast can be injected through the balloon-inflated catheter, which is slowly retracted until resistance is encountered, thus marking the distal extent of the stricture and providing a fluoroscopic estimate of the length of the stricture. The chosen SEMS should be of sufficient length to extend at least 2 cm beyond the stricture at both ends.

Clinical Outcomes

Outcomes regarding palliative SEMS placement at the level of the distal duodenum can be extrapolated from published results on gastric outlet obstruction (GOO) and gastroduodenal stent placement. Duodenal SEMS placement is technically successful in >90% of cases and clinical success is achieved in over 85% of patients [3]. Prior studies have shown SEMS placement to be associated with

faster resumption of oral intake, shorter post procedural hospital stay, lesser morbidity, and lower costs relative to Surg-GE [1]. In one multicenter retrospective study comparing SEMS to EUS-GE, there were no statistically significant differences regarding technical success (92.8% vs 93.7%), clinical success (83.5% vs 92.4%) and rate of adverse events (10.3% vs 10.1%), although two events in the EUS-GE group required surgical management. However, patients in the EUS-GE group had improved stent patency when compared with those in the SEMS group at 3 months (92.2% vs 80.6%, p=0.033) [4]. In a recent meta-analysis comparing SEMS, EUS-GE and Surg-GE, all three modalities showed similar clinical efficacy and a lower technical success rate for EUS-GE. Duodenal SEMS placement had a lower procedure-related bleeding rate but a higher rate of reintervention [5].

Conclusions

Endoscopic SEMS placement for palliation of malignant distal duodenal obstruction should be considered in patients with subpar performance status and short life expectancy (<3 months). In patients with good functional status and anticipated life expectancy >3 months, EUS-GE or Surg-GE should be considered given their lower intervention rates relative to conventional SEMS placement.

References

1. Cheung SLH, Teoh AYB. Optimal management of gastric outlet obstruction in unresectable malignancies. Gut Liver 2022;16:190-197.
2. Baichoo E, Wong Kee Song LM. Palliative enteroscopic stent placement for malignant mid gut obstruction. Gastrointest Interv 2014;3:30-34.
3. Dormann A, Meisner S, Verin N, et al. Self-expanding metal stents for gastroduodenal malignancies: systematic review of their clinical effectiveness. Endoscopy 2004;36:543-50.
4. Sánchez-Aldehuelo R, Subtil Iñigo JC, Moreno BM, et al. EUS-guided gastroenterostomy versus duodenal self-expandable metal stent for malignant gastric outlet obstruction: results from a nationwide multicenter retrospective study. Gastrointest Endosc 2022 Jul 20. Epub ahead of print.
5. Krishnamoorthi R, Bomman S, Benias P, et al. Efficacy and safety of endoscopic duodenal stent versus endoscopic or surgical gastrojejunostomy to treat malignant gastric outlet obstruction: systematic review and meta-analysis. Endosc Int Open 2022;10:E874-E897.

Session 4-2

Radiological stenting with a transhepatic / transgastric access

Jong Hyouk Yun

Department of Radiology, Kosin University Gospel Hospital, Busan, Korea

Gastrointestinal intervention is a treatment of choice in various benign and malignant strictures of gastrointestinal tract. Stent insertion can be an optimal option for the palliation of obstructive symptoms in cases of inoperable malignant gastrointestinal obstruction.
There are various approaches to the gastrointestinal tract using the guide wire and delivery system depending on the anatomical structure, relation and the patient condition such as ptosis or distension of the bowel or previous operative history. Four different approaches can be used in GI intervention: Per-oral, trans-gastric, trans-hepatic and trans-cholecystic. In this presentation, i will discuss about the technical aspect and pros and cons of the four different approaches mentioned above.

Session 4-3

EUS-guided gastrojejunostomy

Kenneth F. Binmoeller

Chief, Division of Advanced Interventional Endoscopy
California Pacific Medical Center
San Francisco, CA USA

Gastric outlet obstruction (GOO) due to malignant duodenal obstruction can be treated either surgically or endoscopically. Surgical gastrojejunostomy (GJ) has been the standard palliative treatment with good functional outcome and long-term relief of symptoms, but carries high postoperative complication rates of up to 40% (Medina-Franco et al, Amer Surg 2007). Additionally, recovery from surgery delays adjuvant cancer treatment. Endoscopic enteral stent placement has advantages of rapid recovery with early relief of obstructive symptoms, but high rates of late stent occlusion, mainly due to tissue ingrowth. Three randomized controlled trials have shown mixed results with two trials favoring endoscopic SEMS (Mehta Surg Endosc 2006; Fiori Anticancer Res 2004) and 1 trial favoring surgical GE (Jeurnink GIE 2010). Owing to the high rate of stent obstruction resulting in recurrent symptoms, surgical GE has been recommended for patients expected to live longer than 2 months.

Since developed and first reported by Binmoeller, EUS-guided gastroenterostomy (EUS-GE) using a lumen-apposing metal stent (LAMS) has emerged as an attractive alternative to surgical GJ, allowing for successful relief of symptoms without the complication risks of surgical bypass and without the time-limited efficacy of endoscopic stent placement. Endoscopic treatment from the inside avoids the infection risks and wound-healing complications of a surgery from the outside while preserving the concept of creating a functional anastomosis away from the obstructed area. Creation of an anastomosis under EUS-guidance enables transenteric access to the targeted loop of small bowel without having to enter the peritoneum with the endoscope. The absence of intervening blood vessels between the two parts of the GI tract is confirmed using Doppler imaging. The “one-step, one-device” electrocautery enhanced delivery system developed by Binmoeller eliminates over-the-wire “Seldinger technique” catheter exchanges, which can lead to loss of wire access and separation between the gastric and small-bowel walls. The wire may also displace the small bowel from the gastric wall increasing the risk of technical failure.

A number of single and multicenter studies have reported EUS-GE to be effective safe and safe (van Wanrooij Endoscopy 2022). Randomized controlled studies comparing EUS-GE with duodenal stenting and laparoscopic gastroenterostomy are lacking, but retrospective comparative studies have reported advantages for EUS-GE and raise the potential for first line treatment (van Wanrooij Endoscopy 2022). Compared to duodenal stenting, EUS-GE displayed higher clinical success and lower GOO recurrence with similar technical success and adverse event rates with (2 studies: Chen Surg Endosc 2017; Ge Surg Endosc 2019) . Compared to laparoscopic gastroenterostomy, EUS-GE displayed fewer symptom recurrences and requirements for reintervention with similar efficacy and safety (4 studies: Khashab Endosc Int Open 2017; Perez-Miranda J Clin Gastroenterol 2017; Bronswijk et al. GIE 2021; Kouanda... Binmoeller Surg Endosc 2021; 35: 7058–7067).

The ideal technique for EUS-GE is still in evolution. Localizing the jejunum on EUS can be challenging, as it is difficult to know exactly which region of the small bowel is being visualized. Additionally, the large and small bowel loops can look similar, especially when collapsed. Two broad approaches have been reported: Balloon-assisted and water-assisted. Balloon-assisted can be performed with a standard single balloon (retrieval or dilation balloon) or a specialized double-balloon catheter (not available in the US). Drawback of the balloon-assisted method is the difficulty encountered advancing the balloon catheter over a guidewire into the proximal jejunum due to looping in the stomach. This is done under fluoroscopic guidance and may require endoscopic assistance. Water-assisted can be performed by directly infusing water across the duodenal stricture into the proximal jejunum through the gastroscope. Drawback is the water may have flowed downstream by the time the gastroscope is exchanged for the echoendoscope for EUS-guided GE. Water can be infused into the small bowel through a 19G FNA needle, but filling is slow and maintaining a water-filled lumen difficult with downstream flow and peristalsis. Our group has reported a simplified water-assisted technique using an oroenteric catheter (OEC) inserted across the stricture into the proximal jejunum to deliver fluid. The gastroscope is removed over the OEC from the patient and the echoendoscope inserted alongside the OEC for EUS-guided GE. Water distension of the small bowel is then possible using a water pump at high flow rate (Nguyen...Binmoeller, Endoscopy 2021).

EUS-GE is the most technically challenging among the spectrum of anastomotic procedures performed with LAMS. Misdeployment or displacement of the LAMS can lead to severe clinical consequences and possibly the need for surgical intervention. In a 16 center retrospective study (Ghandour et al GIE 2022), stent misdeployment occurred in 10% of patients (46/467) , similar to that reported in other studies. Of misdeployments, 11% required surgery and 9% ICU care. A classification system consisting of 4 types was proposed for stent misdeployment based on outcomes and management. The learning curve for EUS-GE is steep, with one study recommending 25 cases to achieve proficiency and 40 to achieve mastery (Jovani, Endosc 2021).

References

1. Binmoeller et al. Endoscopic ultrasound-guided gastroenterostomy using novel tools designed for transluminal therapy: a porcine study. Endoscopy 2012; 44: 499–503
2. van der Merwe et al, Endoscopy. 2022 Feb;54(2):185-205.
3. Chen YI et al. EUS-guided gastroenterostomy is comparable to enteral stenting with fewer re-interventions in malignant gastric outlet obstruction. Surg Endosc 2017; 31: 2946–2952
4. Ge et al. EUS-guided gastroenterostomy versus enteral stent placement for palliation of malignant gastric outlet obstruction. Surg Endosc 2019; 33: 3404–3411
5. Khashab MA et al. International multicenter comparative trial of endoscopic ultrasonography-guided gastroen- terostomy versus surgical gastrojejunostomy for the treatment of malignant gastric outlet obstruction. Endosc Int Open 2017; 5: E275–E281
6. Perez-Miranda et al. EUS-guided gastrojejunostomy versus laparoscopic gastrojejunostomy: an international collaborative study. J Clin Gastroenterol 2017; 51: 896–899
7. Bronswijk et al. Laparoscopic versus EUS-guided gastroenterostomy for gastric outlet obstruction: an international multicenter propensity score–matched comparison (with video). Gastrointest Endosc. 2021; 94: 526-536
8. Kouanda, Binmoeller et al. Endoscopic ultrasound- guided gastroenterostomy versus open surgical gastrojejunostomy: clinical outcomes and cost effectiveness analysis. Surg Endosc 2021; 35: 7058–7067
9. Nguyen Nam ...Binmoeller. Endoscopic ultrasound-guided gastroenterostomy using an oroenteric catheter-assisted technique: a retrospective analysis. Endoscopy 2021; 53: 1–4
10. Ghandour et al, Classification, outcomes, and management of misdeployed stents during EUS-guided gastroenterostomy Gastrointest Endosc 2022;95:80-9
11. Jovani et al. Assessment of the learning curve for EUS-guided gastroenterostomy for a single operator. Gastrointest Endosc 2021;93:1088-93.

Session 4-4

Surgical Gastrojejunostomy for malignant obstruction at the level of the distal duodenum

Chung-Sik Gong

Department of Upper Gastrointestinal Surgery, Asan Medical Center, Seoul, Korea

Introduction

Surgical Gastrojejunostomy(GJ) is one of the most commonly used surgical management in gastric outlet obstruction(GOO). GOO means gastric emptying is inhibited mechanically by a peptic ulcer or malignant disease. During gastric obstruction by peptic ulcer disease, GJ with truncal vagotomy and antrectomy was a surgical management choice. For this reason, GJ bypass was commonly performed when GOO occurred. However, peptic ulcer disease decreased recently due to proton pump inhibitors, eradication of Helicobacter pylori, etc. For this reason, now a time, the main cause of GOO was malignant disease. Bypass is the surgical management choice for bowel obstruction. GJ anastomosis is simple and easy to perform, and additional partition of the stomach also can delay the obstruction of the anastomosis site by a tumor growing. Unfortunately, after GJ anastomosis, the stomach cannot perform any more functions and remains only a tract of food passage. For this reason, other surgical manages must be considered for distal duodenal obstruction.

Diagnosis

GOO diagnosis must be preceded by history taking and physical examination. Endoscopy and CT scan are efficient for diagnosis such as distinguishing between benign and malignant disease. In addition, it is necessary to confirm the location of an obstruction at the pylorus level or duodenum level. Furthermore, it is necessary to confirm to what extent the duodenum is affected. In the case of obstruction due to malignant disease, the perception of resectability should be evaluated, and whether or not resection affects progression should be evaluated, too. After bypass surgery is decided, how(open vs laparoscopic approach) and where(GJ vs duodeno-jejunostomy(DJ), or gastrostomy, jejunostomy, etc.) are considered. On top of that, after bypass surgery, as the disease aggravation, it is necessary to consider how the surgical site will be affected. On the other hand, when the disease improved with additional treatment and when the conversion surgery is required, the operation should be planned while also considering that the previous operation affects the conversion surgery.

Treatment

GOO can be occurred not only by benign disease but also by malignant diseases such as pancreas head cancer, common bile duct cancer, hepatic or gallbladder cancer, and metastatic tumor. When evaluating a patient before surgery, general conditions including malnutrition due to poor oral intake, chemotherapy or radiotherapy schedule, and factors affecting surgical complications such as ascites and coagulopathy should be considered as a whole. In addition, the possibility of obstruction at the distal rather than the already known location of obstruction should also be considered. At the start of the operation, if it is possible to explore the obstruction area, it should be attempted. And more, it is necessary to evaluate whether small bowel is redundant, jejunal obstruction, or colon obstruction especially transverse colon before bypass operation. Based on these evaluations, it is necessary to sufficiently discuss with the patient the possibility of feeding jejunostomy, gastrostomy, jejunostomy for drainage, ileo-sigmoid bypass, ileostomy, colostomy and open and closure before operation.

When there is obstruction of the first portion of the duodenum around the pylorus, GJ bypass with/without Braun anastomosis will be the 1st choice. However, if the cause is a malignant disease and a disease that can extend to the upper stomach, the partition of the stomach should be considered. After the GJ is performed, the storage and digesting functions of the stomach would be disappeared. This result in physiological changes is similar to distal gastrectomy patients including dumping syndrome. Therefore, in the case of distal duodenal obstruction, DJ should be considered. The DJ bypass, which has been performed as an option for superior mesenteric artery(SMA) syndrome, is more difficult than GJ and has a high possibility of complications compared with GJ, and in particular, sufficient experience in the laparoscopic approach to the duodenum is required. However, despite these difficulties, it has the advantage of preserving the functions of the stomach and pylorus.

Conclusion

It should be decided case by case whether to perform intervention or surgical management for distal duodenal obstruction. If the surgical management was decided, before and during operation, proper evaluation of disease and obstruction status is required. After that, it is needed to decide which part to bypass so that oral intake is possible according to the surgeon's experience and knowledge. For distal duodenal obstruction, DJ is recommended rather than GJ for saving stomach function, and should be considered that it is an irreversible and permanent procedure.

Compared to interventional treatment, surgical treatment requires a period of recovery and wound healing regardless of the success of the operation. Recently, the laparoscopic approach has enabled a short hospital stay after the operation. Furthermore, laparoscopic exploration makes it possible that stage evaluation including seeding nodule biopsy and intra-abdominal washing cytology and to perform additional procedures such as feeding jejunostomy, drainage, and decompression, which have additional benefits compared to intervention. Also, compared with a stent, it has the advantage of long-term maintenance after bypass surgery.

Session 5-1

The five most important studies on systemic treatment

Tatsuya Yamashita

Department of Gastroenterology, Kanazawa University Hospital, Kanazawa, Japan

Introduction

Since the advent of the evidence of sorafenib as systemic therapy for hepatocellular carcinoma (HCC), many clinical trials to develop first-line therapy with sorafenib as control have been carried out (1). In addition, many clinical trials have been conducted to develop a second-line therapy after sorafenib treatment. However, no new systemic therapy has emerged for about a decade. After evidence of the molecular targeting agent (MTAs) regorafenib appeared, evidence of MTAs, lenvatinib, cabozantinib, and ramucirumab subsequently appeared (2-4). In 2020, evidence of the combination immunotherapy of atezolizumab and bevacizumab was reported (5,6). The age of immunotherapy has started, and evidence of immunotherapy has appeared one after another in recent years (8,9). In this section, I introduce the five most important studies on first-line systemic treatment for HCC, although many important studies showed positive and negative results in first- and second-line settings.

1. SHARP study, sorafenib vs. placebo

Before this SHARP trial, no effective systemic therapy exists for patients with advanced HCC. SHARP trial was a multicenter, phase 3, double-blind, randomized controlled trial (RCT) comparing sorafenib, an oral multikinase inhibitor of the vascular endothelial growth factor receptor, the platelet-derived growth factor receptor, and Raf, with placebo as the first-line systemic therapy. The primary endpoints were overall survival (OS) and the time to symptomatic progression. At the second planned interim analysis, the study was stopped because of a statistically significant improvement in overall survival. Median survival time (MST) was 10.7 months in the sorafenib group and 7.9 months in the placebo group (hazard ratio [HR] in the sorafenib group, 0.69; P<0.001). The major antitumor effect of sorafenib was to prevent disease progression. As adverse events (AEs) of sorafenib, diarrhea, weight loss, and hand-foot skin reaction (HFSR) were more frequent in the sorafenib group (1). This study is one of the most important studies in systemic treatment for advanced HCC because it was the first study that proved the survival benefit of systemic treatment. By this SHARP study, sorafenib became the standard of care (SOC) in the first-line systemic therapy for patients with advanced HCC.

2. REFLECT, lenvatinib vs. sorafenib

REFLECT was an open-label RCT comparing lenvatinib, an inhibitor of VEGF receptors 1–3, FGF receptors 1–4, PDGF receptor □, RET, and KIT, with sorafenib as a first-line treatment for unresectable HCC. The daily dose of lenvatinib was reduced from 12mg to 8mf for patients with bodyweight <60 kg. The primary endpoint was overall survival. MST for the lenvatinib group of 13.6 months was non-inferior to the sorafenib group (12.3 months, HR 0.92, 95% confident interval [CI] 0.79–1.06), meeting the criteria for preset noninferiority margin 1.08. The survival superiority of lenvatinib to sorafenib was not achieved. However, median progression-free survival (PFS) judged with modified RECIST was almost double in the lenvatinib group (7.4 months vs. 3.7 months, HR 0.66). The most common AEs were hypertension, diarrhea, decreased appetite, and decreased weight for lenvatinib (3). Although lenvatinib showed only noninferiority but superiority to sorafenib, lenvatinib became an alternative first-line systemic treatment.

3. IMbrave150 study, atezolizumab-bevacizumab vs. sorafenib

IMbrave150 study was an open-label RCT comparing the combination treatment of atezolizumab and bevacizumab to sorafenib as a first-line systemic treatment for patients with unresectable HCC. This study set co-primary endpoints, OS and PFS. At the time of the primary analysis, the HR for death with atezolizumab–bevacizumab as compared with sorafenib was 0.58 (95% CI, 0.42 to 0.79; P<0.001). OS at 12 months was 67.2% with atezolizumab-bevacizumab and 54.6% with sorafenib. Median PFS was 6.8 months in atezolizumab-bevacizumab and 4.3 months in the sorafenib group (HR 0.59, P<0.001) (6). In updated data, MST in atezolizumab-bevacizumab was 19.2 months, and that in sorafenib was 13.4 months (HR 0.66, p <0.001). In this study, atezolizumab-bevacizumab showed survival superiority over sorafenib and became SOC in the first-line systemic therapy for patients with advanced HCC. Moreover, this study was the first positive evidence of immunotherapy for HCC.

4. HIMALAYA study, tremelimumab-duruvalmab (STRIDE) vs. soafenib

A single, high priming dose of tremelimumab (anti-cytotoxic T lymphocyte-associated antigen 4, CTLA-4) plus durvalumab (anti-programmed cell death ligand-1, PD-L1), an infusion regimen termed STRIDE (Single Tremelimumab Regular Interval Durvalumab) was compared with sorafenib in an open-label RCT, HIMALAYA study, The primary objective was OS (STRIDE vs. sorafenib). The secondary was OS (durvalmab monotherapy vs. sorafenib). The MST was 16.4 months with STRIDE, 16.6 months with durvalumab, and 13.8 months with sorafenib. The OS HR for STRIDE versus sorafenib was 0.78 (p=0.0035). OS with durvalumab monotherapy was noninferior to sorafenib (HR 0.86; 95.67% CI, 0.73 to 1.03; noninferiority margin, 1.08). Median PFS was not significantly different among all three groups. STRIDE significantly improved OS versus sorafenib (8). Durvalumab monotherapy was noninferior to sorafenib for patients with unresectable hepatocellular carcinoma. This HIMALAYA study showed evidence of novel immunotherapy combined with CTLA-4 and PD-L1 for unresectable HCC. STRIDE became an alternative first-line systemic treatment.

5. COSMOS-312 study, cabozantinib-atezolizumab vs. sorafenib

The COSMIC-312 study, an open-label RCT, assessed cabozantinib-atezolizumab versus sorafenib as a first-line systemic treatment for advanced HCC. The study set co-primary endpoints PFS and OS, and meeting either of the primary endpoints would indicate the superiority of cabozantinib-atezolizumab. Final PFS in the interim analysis showed significant improvement in cabozantinib-atezolizumab (6.8 months vs. 4.2 months, HR 0.63, p=0.0012). However, MST was not significantly improved (15.4 months vs. 15.5 months, HR 0.90, p=0.44). The most common AEs were liver injury, hypertension, and HFSR (9). Although this COSMOS-312 became a poritive study as clinical trial and cabozantinib-atezolizumab became an optional first-line systemic treatment for unresectable HCC, the result of the final OS is waiting for further interpretation.

Conclusions

Systemic treatment for unresectable HCC enters the era of immunotherapy. Novel two regimens, STRIDE and cabozantinib-atezolizumab, showed positive results to become one of the first-line treatments. There is no direct evidence to order these three immunotherapies because all three immunotherapies have been compared to sorafenib. In the future, the selection of first-line immunotherapy must be discussed, and the subsequent treatment, including MTAs not introduced in this section, also must be discussed.

References

1. Llovet JM, Ricci S, Mazzaferro V, et al. Sorafenib in advanced hepatocellular carcinoma. N Engl J Med. 2008; 359: 378-390.
2. Bruix J, Qin S, Merle P, et al. Regorafenib for patients with hepatocellular carcinoma who progressed on sorafenib treatment (RESORCE): a randomised, double-blind, placebo-controlled, phase 3 trial. Lancet. 2017; 389: 56-66.
3. Kudo M, Finn RS, Qin S, et al. Lenvatinib versus sorafenib in first-line treatment of patients with unresectable hepatocellular carcinoma: a randomised phase 3 noninferiority trial. Lancet. 2018; 391: 1163-1173.
4. Abou-Alfa GK, Meyer T, Cheng AL, et al. Cabozantinib in Patients with Advanced and Progressing Hepatocellular Carcinoma. N Engl J Med. 2018; 379: 54-63.
5. Zhu AX, Kang YK, Yen CJ, et al. Ramucirumab after sorafenib in patients with advanced hepatocellular carcinoma and increased

alpha-fetoprotein concentrations (REACH-2): a randomised, double-blind, placebo-controlled, phase 3 trial. Lancet Oncol. 2019; 20: 282-296.
6. Finn RS, Qin S, Ikeda M, et al. Atezolizumab plus Bevacizumab in Unresectable Hepatocellular Carcinoma. N Engl J Med. 2020; 382: 1894-1905.
7. Cheng AL, Qin S, Ikeda M, et al. Updated efficacy and safety data from IMbrave150: Atezolizumab plus bevacizumab vs. sorafenib for unresectable hepatocellular carcinoma. J Hepatol. 2022; 76: 862-873.
8. Abou-Alpha GK, Lau G, Kudo M, et al. Tremelimumab plus Durvalumab in Unresectable Hepatocellular Carcinoma. NEJM Evid published June 6, 2022: DOI: 10.1056/EVIDoa2100070.
9. Kelley RK, Rimassa L, Cheng AL, et al. Cabozantinib plus atezolizumab versus sorafenib for advanced hepatocellular carcinoma (COSMIC-312): a multicentre, open-label, randomised, phase 3 trial. Lancet Oncol. 2022; 23:995-1008

Session 5-2

Improving outcome of liver resection and liver transplantation in combination with other treatment modalities under multidisciplinary approach in advanced hepatocellular carcinoma

Jinsoo Rhu

Department of Surgery, Samsung Medical Center,
Sungkyunkwan University School of Medicine, Korea

Recently, Barcelona Clinic of Liver Cancer (BCLC) guideline has been updated. In the guideline, the role of liver transplantation (LT) has been extended toward both directions. For early hepatocellular carcinoma (HCC), LT has been recommended for patients with portal hypertension when there is no contraindication. For intermediate stage HCC, LT is still recommended when successful downstaging has been achieved. This represents the improved outcome achieved by LT during the decades. Although the guideline limited surgical resection for early-stage HCC with normal liver function, surgical resection is still a favorable modality for both early and advanced HCC. Even in HCC with portal vein tumor thrombosis, surgical resection has its role in certain patients. Other locoregional treatments have been evolved to achieve better outcome and they are combined with various treatment modalities. Alongside with transcatheter arterial chemoembolization, radiofrequency ablation, and radiotherapy, transarterial radioembolization has been just recently came into the practice against HCC. By combining these treatment modalities, previously unresectable or resectable but unbeneficial cases are becoming beneficial with resection. In this presentation, key papers for liver resection and LT for advanced HCC will be introduced.

Session 5-3

The five most important studies for TARE

Edward Kim

Interventional Radiology, Mount Sinai Hospital, Icahn School of Medicine, New York, USA

Introduction

Trans-arterial radioembolization is a locoregional radiation based treatment that is minimally invasive and allows for treatment of lesions in complex anatomic location. Trans-arterial radioembolization (TARE) has been most widely utilized with Yttrium-90 as the radioisotope. TARE rarely causes occlusion of the targeted vessels, and seeds the target tissue with spheres around 40 microns in size. This allows oxygenated blood to potentiate the effects of the radiation over time. There are two matrices currently utilized as a carrier for the Yttrium-90. Glass microspheres have Y90 embedded into the matrix of the glass, allowing for high specific activities and variability in the number of spheres delivered. Resin microspheres have the Y90 bonded to the outside of the sphere, and therefore, the amount of dose is adjusted based on the number of spheres delivered.

The main applications of radioembolization in patients with BCLC early stage HCC are as curative therapy or as bridging/downstaging therapy to achieve and maintain criteria necessary for transplant, and in patients with BCLC intermediate, either as a downstaging or palliative therapy, or advanced stage HCC, as a palliative therapy.

DOSISPHERE was a phase II randomized controlled trial of patients treated with Y90 using standard dosimetry versus personalized/more selective dosimetry. This study included a large proportion of patients with portal tumor vascular invasion and also showed that increased dose was associated with improved outcomes. Patients who had received > 205 Gy had a median overall survival of 26.6 months versus 7 months in patients who received < 205 Gy.

First Main Body

DOSISPHERE was a phase II randomized controlled trial of patients treated with Y90 using standard dosimetry versus personalized/more selective dosimetry. This study included a large proportion of patients with portal tumor vascular invasion and also showed that increased dose was associated with improved outcomes. Patients who had received > 205 Gy had a median overall survival of 26.6 months versus 7 months in patients who received < 205 Gy (67).

Second Main Body

LEGACY study, which evaluated Local radioEmbolization using Glass microspheres for the Assessment of Tumor Control with Y90 and in 2021, provided supportive data for approval of Y90 glass microspheres by the United States Food and Drug Administration. This study was a retrospective single arm multi-center study that demonstrated that high radiation doses can be delivered to a target lesion resulting in a high objective response rate while sparing surrounding parenchyma.

Conclusions

The 5 most important studies will be presented regarding radioembolization in the role of HCC management.

References

1. Garin E, Tselikas L, Guiu B, Chalaye J, Edeline J, de Baere T, Assenat E, Tacher V, Robert C, Terroir-Cassou-Mounat M, Mariano-Goulart D, Amaddeo G, Palard X, Hollebecque A, Kafrouni M, Regnault H, Boudjema K, Grimaldi S, Fourcade M, Kobeiter H, Vibert E, Le Sourd S, Piron L, Sommacale D, Laffont S, Campillo-Gimenez B, Rolland Y; DOSISPHERE-01 Study Group. Personalised versus standard dosimetry approach of selective internal radiation therapy in patients with locally advanced hepatocellular carcinoma (DOSISPHERE-01): a randomised, multicentre, open-label phase 2 trial. Lancet Gastroenterol Hepatol. 2021 Jan;6(1):17-29. doi: 10.1016/S2468-1253(20)30290-9. Epub 2020 Nov 7. PMID: 33166497.
2. Salem R, Johnson GE, Kim E, Riaz A, Bishay V, Boucher E, Fowers K, Lewandowski R, Padia SA. Yttrium-90 Radioembolization for the Treatment of Solitary, Unresectable HCC: The LEGACY Study. Hepatology. 2021 Nov;74(5):2342-2352. doi: 10.1002/hep.31819. Epub 2021 Jun 11. PMID: 33739462; PMCID: PMC8596669.
3. Kim E, Sher A, Abboud G, Schwartz M, Facciuto M, Tabrizian P, Knešaurek K, Fischman A, Patel R, Nowakowski S, Llovet J, Taouli B, Lookstein R. Radiation segmentectomy for curative intent of unresectable very early to early stage hepatocellular carcinoma (RASER): a single-centre, single-arm study. Lancet Gastroenterol Hepatol. 2022 Sep;7(9):843-850. doi: 10.1016/S2468-1253(22)00091-7. Epub 2022 May 23. PMID: 35617978.
4. Dhondt E, Lambert B, Hermie L, Huyck L, Vanlangenhove P, Geerts A, Verhelst X, Aerts M, Vanlander A, Berrevoet F, Troisi RI, Van Vlierberghe H, Defreyne L. 90Y Radioembolization versus Drug-eluting Bead Chemoembolization for Unresectable Hepatocellular Carcinoma: Results from the TRACE Phase II Randomized Controlled Trial. Radiology. 2022 Jun;303(3):699-710. doi: 10.1148/radiol.211806. Epub 2022 Mar 8. PMID: 35258371.
5. Cappelli A, Sangro P, Mosconi C, Deppe I, Terzi E, Bilbao JI, Rodriguez-Fraile M, De Benedittis C, Ricke J, Golfieri R, Sangro B. Transarterial radioembolization in patients with hepatocellular carcinoma of intermediate B2 substage. Eur J Nucl Med Mol Imaging. 2019 Mar;46(3):661-668. doi: 10.1007/s00259-018-4152-7. Epub 2018 Sep 12. PMID: 30209522.

Session 5-4

The five most important studies on radiotherapy

Jinhong Jung

Department of Radiation Oncology, Asan Liver Center, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

TACE plus RT vs. TACE alone for unresectable HCC

The Barcelona Clinic Liver Cancer (BCLC) staging system suggests systemic treatment for an advanced stage hepatocellular carcinoma (HCC). However, some other guidelines, including the Korea practice guideline, propose that transarterial chemoembolization (TACE) and TACE plus radiation therapy (RT) should also be considered alongside systemic therapy. TACE is the most common treatment modality for the advanced HCC in the real-world setting. With remarkable recent technological advancements in the field of RT such as 3-imensional conformal radiotherapy, stereotactic body radiotherapy, and intensity modulated radiotherapy, higher radiation dose can be focused to the tumor while sparing the normal non-tumor-bearing normal liver and surrounding organs from substantial radiation. Several trials have demonstrated a considerable therapeutic benefit of TACE plus RT compared with TACE alone for unresectable HCC. Huo et al. conducted a meta-analysis to evaluate the efficacy and safety of TACE plus RT based on these trials, and found that in patients with unresectable HCC, particularly those with portal vein tumor thrombosis (PVTT), TACE plus RT significantly improves survival up to 5 years as well as tumor response compared to TACE alone.(1)

TACE plus RT vs. sorafenib for HCC with MVI

The prognosis for patients with advanced-stage HCC is dismal. Particularly, the benefit of systemic therapy for patients with a high disease burden, especially those with macroscopic vascular invasion (MVI), is not so good so far. TACE plus RT has therapeutic benefits for unresectable HCC. Especially in case of HCC with MVI which is a major obstacle to performing TACE, focal field RT targeting the MVI before or immediately after TACE was expected decrease intravascular tumor growth and maintain portal blood flow, allowing the maintenance of normal liver function, limiting intrahepatic tumor spread, and thereby allowing additional TACE. In several observational studies, the combination of TACE with RT demonstrated promising radiologic response rates and improved overall survival in patients with HCC and MVI compared with sorafenib. Yoon et al. conducted randomized controlled trial to assess the efficacy and safety of TACE plus RT versus sorafenib for patients with HCC and MVI, and found that the combined treatment of TACE and RT improved progression-free survival, objective response rate, time to progression, and overall survival compared with sorafenib.(2)

Early radiologic response after TACE plus RT for HCC with MVI

Vascular invasion is one of the main routes of disease spreading from the primary tumor site as well as an important factor for the deterioration of hepatic function. Considering the major contribution of MVI to poor prognosis, achievement of early response and higher response rate may be a priority in selecting the optimal initial treatments. Jung et al. analyzed the radiologic response of combined TACE plus RT for treatment-naïve, liver-confined HCC patients with MVI, and demonstrated that the early radiologic response at 2 months after RT was a significant prognostic factor for OS in patients with advanced-stage HCC showing MVI after treatment with combined TACE plus RT.(3)

Optimal radiotherapeutic strategy for HCC with PVTT

Theoretically, for higher response, a higher radiation dose or combination therapy is required. The heterogeneity of treatment strategies, such as dose-fraction schemes, RT volume, and combined treatment, according on the institution, makes the ideal treatment method unclear. Korea Radiation Oncology Group (KROG) investigated optimal radiotherapeutic strategy in patients with HCC and PVTT in a nationwide retrospective Korean cohort and demonstrated that multimodal treatment with TACE plus RT using RT doses greater than 45 Gy could improve PVTT response and local control, which could be translated into OS benefits.(4)

Neoadjuvant RT for HCC with PVTT

Surgical treatment is associated with improved survival results than nonsurgical treatment for PVTT restricted to the first-order branch of the main portal vein, according to retrospective studies. When the PVTT has invaded the left- or right-side branch or main trunk of the portal vein, it is difficult to perform en bloc resection of the tumor together with the PVTT. Therefore, by downstaging the extent of PVTT and/or HCC prior to surgery using radiotherapy, the risk of tumor spread or residual disease could be reduced, resulting in improved postoperative survival. Based on this hypothesis, Wei et al. conducted randomized controlled trial to assess the roles of neoadjuvant RT in patients with HCC and PVTT and validated the survival benefit of neoadjuvant RT.(5)

References

1. Huo YR, Eslick GD: Transcatheter Arterial Chemoembolization Plus Radiotherapy Compared With Chemoembolization Alone for Hepatocellular Carcinoma: A Systematic Review and Meta-analysis. JAMA Oncol 2015, 1(6):756-765.
2. Yoon SM, Ryoo BY, Lee SJ, Kim JH, Shin JH, An JH, Lee HC, Lim YS: Efficacy and Safety of Transarterial Chemoembolization Plus External Beam Radiotherapy vs Sorafenib in Hepatocellular Carcinoma With Macroscopic Vascular Invasion: A Randomized Clinical Trial. JAMA Oncol 2018, 4(5):661-669.
3. Jung J, Joo JH, Kim SY, Kim JH, Choi J, Lee D, Shim JH, Kim KM, Lim YS, Lee HC et al: Radiologic Response as a Prognostic Factor in Advanced Hepatocellular Carcinoma with Macroscopic Vascular Invasion after Transarterial Chemoembolization and Radiotherapy. Liver Cancer 2022, 11(2):152-161.
4. Im JH, Yoon SM, Park HC, Kim JH, Yu JI, Kim TH, Kim JW, Nam TK, Kim K, Jang HS et al: Radiotherapeutic strategies for hepatocellular carcinoma with portal vein tumour thrombosis in a hepatitis B endemic area. Liver Int 2017, 37(1):90-100.
5. Wei X, Jiang Y, Zhang X, Feng S, Zhou B, Ye X, Xing H, Xu Y, Shi J, Guo W et al: Neoadjuvant Three-Dimensional Conformal Radiotherapy for Resectable Hepatocellular Carcinoma With Portal Vein Tumor Thrombus: A Randomized, Open-Label, Multicenter Controlled Study. J Clin Oncol 2019, 37(24):2141-2151.

Session 6-1

Case presentation; Differential diagnosis of small bowel ulcerative lesions focusing on capsule endoscopy

Su Hwan Kim

Department of Internal Medicine, SMG-SNU Boramae Medical Center, Seoul National University College of Medicine, Seoul, Korea

Introduction

Capsule endoscopy is noninvasive and can monitor the entire small intestine unlike the traditional endoscopic examination. Here, we would like to introduce various cases of diagnosing ulcerative lesions in the small intestine through capsule endoscopy.

Case 1

A 29-year-old male patient with a history of being hospitalized 2 years ago for obscure gastrointestinal bleeding presented to the emergency department due to melena which was persistent for 5 days. The result of gastroscopic examination was superficial gastritis. Colonoscopic examination showed erosions in the cecum. In capsule endoscopy, multiple ulcers and spontaneous bleeding were observed from the proximal ileum, and capsule retention was identified in the small intestinal stricture area. Abdominal CT scan was performed and peritonitis was confirmed. Open small bowel segmental resection was performed by surgical contact. Adhesion and small bowel perforation were identified at the 15cm proximal side of the ileocecal valve. Resection and anastomosis was performed. After surgical resection, symptoms improved and the patient was discharged from the hospital.

Case 2

A 78-year-old female patient who had been taking aspirin for vascular dementia and nabumetone for osteoarthritis was hospitalized due to melena which persisted for 1 week. Blood test revealed a hemoglobin level of 8.3 g/dL. Gastroscopic examination showed gastritis. In the colonoscopic examination, erosions of the terminal ileum were observed. In capsule endoscopy, multiple ulcers with spontaneous bleeding were observed in the jejunum and ileum. Nabumetone and aspirin were discontinued and melena was not observed. In consultation with the neurologists, aspirin was resumed after 8 days of hospitalization. Afterwards, she was discharged from the hospital for no additional melena.

Case 3

A 75-year-old female patient with diabetes mellitus and hypertension had diarrhea for 6 months and 12kg weight loss. She also had recurrent postprandial abdominal pain within 30 minutes. She underwent colonoscopic examination which showed multiple colonic ulcerations and erosions. Microscopic examination showed chronic colitis without evidence of cytomegalovirus infection. The result of Congo red staining was negative. The result of PCR for tuberculosis was also negative. In capsule endoscopy, multiple ileal ulcers and erosions were identified. Abdominal aorta CT angiography was performed and superior mesenteric artery stenosis with dense vascular wall calcification was identified. A balloon expandable vascular stent was inserted in the superior mesenteric artery stenosis area. She had no abdominal pain after the vascular stent insertion and was discharged from the hospital.

Case 4

A 59-year-old male patient who underwent radical nephroureterectomy for papillary urothelial carcinoma presented to the hospital with abdominal pain and nausea that began a week ago. Abdominopelvic CT scan suggested small intestinal tumor. In capsule endoscopy, ulcerative mass was suspected in the jejunum. Open small bowel segmental resection was performed. Symptoms improved and he was discharged from the hospital.

Conclusion

Capsule endoscopy is a useful tool for diagnosing inflammatory or ulcerative lesions in the small intestine. Various inflammatory lesions can occur in the small intestine, including inflammatory bowel disease, NSAID enteropathy, and ischemic enteritis. Small intestinal malignancies can also appear in the form of ulcerative lesions.

Session 6-2

CT enterography or MR enterography

Jiyeon Ha

Department of radiology, Kangdong Seong-Sim Hospital, Hallym University College of Medicine, Seoul, Korea

Introduction

Since the introduction of disease-modifying therapy for Crohn's disease (CD), including biologic agents and immunosuppressive treatment, the goal for the treatment of CD has changed from symptomatic control to disease remission (1). Consequently, periodic monitoring of the disease regardless of patient symptoms after the administration of medications has become crucial for managing patients with CD. For the small bowel follow-up, radiological imaging plays a vital role, as the small bowel is more challenging to evaluate with endoscopy than the colorectum(2, 3). Both magnetic resonance enterography (MRE) and computed tomography enterography (CTE) are considered appropriate for the therapeutic monitoring of CD according to current practice guidelines [4].

CT enterography and MR enterography for therapeutic monitoring

Multiple studies have investigated the use of MRE alone or CTE alone as a tool for therapeutic monitoring of CD (4-8). MRE and CTE are often cited as having similar performance in evaluating CD. MRE is preferred to CTE due to the lack of radiation exposure, but MRE is more costly and generally less readily accessible than CTE (2, 9). MRE provides more imaging features for assessing bowel inflammation, including data that cannot be obtained at all with CTE, such as signal intensity on T2-weighted images and diffusion restriction (10, 11). The interpretation would become more straightforward, confident, and consistent by referring to the changes in multiple imaging features.

Mixed use of CT enterography and MR enterography

CTE is often used alternatively to MRE in clinical practice for the management of patients with CD. But combining CTE and MRE for routine periodic follow-up for bowel inflammation in Crohn`s disease may introduce irregularities. The previous study showed higher reliability and accuracy for consistent MRE use during routine periodic follow-up (12). It is difficult to compare the degree of mural hyperenhancement, detected by CTE and MRE because their technical mechanisms of contrast enhancement and tissue contrast are different and the degree of mural enhancement may not be an accurate indicator of inflammatory severity unless some internal normalization or quantitative measures is utilized. Therefore, the comparison between CTE and MRE is mostly reduced to observing an apparent decrease or increase in the extent of bowel inflammation and changes in mural thickness.

Conclusions

The consistent use of MRE is favored for the routine follow-up of bowel inflammation in Crohn`s disease. Mixed use of CTE and MRE is probably not the best strategy for follow-up imaging examination.

References

1. Peyrin-Biroulet L, Sandborn W, Sands BE, Reinisch W, Bemelman W, Bryant RV, et al. Selecting Therapeutic Targets in Inflammatory Bowel Disease (STRIDE): Determining Therapeutic Goals for Treat-to-Target. Am J Gastroenterol. 2015;110(9):1324-38. Epub 20150825. doi: 10.1038/ajg.2015.233. PubMed PMID: 26303131.
2. Park SH, Ye BD, Lee TY, Fletcher JG. Computed Tomography and Magnetic Resonance Small Bowel Enterography: Current Status and Future Trends Focusing on Crohn's Disease. Gastroenterol Clin North Am. 2018;47(3):475-99. Epub 20180707. doi: 10.1016/j.gtc.2018.04.002. PubMed PMID: 30115433.
3. Bruining DH, Bhatnagar G, Rimola J, Taylor S, Zimmermann EM, Fletcher JG. CT and MR enterography in Crohn's disease: current and future applications. Abdom Imaging. 2015;40(5):965-74. doi: 10.1007/s00261-015-0360-9. PubMed PMID: 25637127.
4. Ordas I, Rimola J, Rodriguez S, Paredes JM, Martinez-Perez MJ, Blanc E, et al. Accuracy of magnetic resonance enterography in assessing response to therapy and mucosal healing in patients with Crohn's disease. Gastroenterology. 2014;146(2):374-82 e1. Epub 20131029. doi: 10.1053/j.gastro.2013.10.055. PubMed PMID: 24177375.
5. Tielbeek JA, Lowenberg M, Bipat S, Horsthuis K, Ponsioen CY, D'Haens GR, et al. Serial magnetic resonance imaging for monitoring medical therapy effects in Crohn's disease. Inflamm Bowel Dis. 2013;19(9):1943-50. doi: 10.1097/MIB.0b013e3182905536. PubMed PMID: 23765176.
6. Van Assche G, Herrmann KA, Louis E, Everett SM, Colombel JF, Rahier JF, et al. Effects of infliximab therapy on transmural lesions as assessed by magnetic resonance enteroclysis in patients with ileal Crohn's disease. J Crohns Colitis. 2013;7(12):950-7. Epub 20130212. doi: 10.1016/j.crohns.2013.01.011. PubMed PMID: 23411006.
7. Huh J, Kim KJ, Park SH, Park SH, Yang SK, Ye BD, et al. Diffusion-Weighted MR Enterography to Monitor Bowel Inflammation after Medical Therapy in Crohn's Disease: A Prospective Longitudinal Study. Korean J Radiol. 2017;18(1):162-72. Epub 20170105. doi: 10.3348/kjr.2017.18.1.162. PubMed PMID: 28096726; PubMed Central PMCID: PMC5240495.
8. Wu YW, Tang YH, Hao NX, Tang CY, Miao F. Crohn's disease: CT enterography manifestations before and after treatment. Eur J Radiol. 2012;81(1):52-9. Epub 20101223. doi: 10.1016/j.ejrad.2010.11.010. PubMed PMID: 21185142.
9. Grand DJ, Beland M, Harris A. Magnetic resonance enterography. Radiol Clin North Am. 2013;51(1):99-112. doi: 10.1016/j.rcl.2012.09.007. PubMed PMID: 23182510.
10. Bruining DH, Zimmermann EM, Loftus EV, Jr., Sandborn WJ, Sauer CG, Strong SA, et al. Consensus Recommendations for Evaluation, Interpretation, and Utilization of Computed Tomography and Magnetic Resonance Enterography in Patients With Small Bowel Crohn's Disease. Radiology. 2018;286(3):776-99. Epub 20180110. doi: 10.1148/radiol.2018171737. PubMed PMID: 29319414.
11. Park SH. DWI at MR Enterography for Evaluating Bowel Inflammation in Crohn Disease. AJR Am J Roentgenol. 2016;207(1):40-8. Epub 20160309. doi: 10.2214/AJR.15.15862. PubMed PMID: 26959382.
12. Ha J, Park SH, Son JH, Kang JH, Ye BD, Park SH, et al. Is the Mixed Use of Magnetic Resonance Enterography and Computed Tomography Enterography Adequate for Routine Periodic Follow-Up of Bowel Inflammation in Patients with Crohn's Disease? Korean J Radiol. 2022;23(1):30-41. Epub 20210913. doi: 10.3348/kjr.2021.0072. PubMed PMID: 34564963; PubMed Central PMCID: PMC8743145.

Session 6-3

Small bowel and Pan-enteric capsule endoscopy

Naoki Hosoe

Center for Diagnostic and Therapeutic Endoscopy, Keio University School of Medicine, Tokyo, Japan

Introduction

More than 20 years has passed since the advent of small bowel capsule endoscopy, it is now an indispensable method used to directly observe the whole small intestine. Subsequently, Colon capsule endoscopy (CCE) developed to explore the colon in 2006.(1) The first-generation CCE had moderate sensitivity for detecting colonic neoplasia(2), CCE was improved regarding the frame rate taken pictures and field of view, the second-generation CCE (CCE-2) was introduced.(3) CCE-2 is a high-performance capsule endoscope that passes through the esophagus, stomach, and small intestine and reaches the colon while imaging each organ. The concept of using a single capsule endoscope to observe the entire gastrointestinal tract with the CCE-2 was reported.(4)

Small bowel colon (SBC) capsule endoscopy

Based on above mentioned concept, an SBC capsule endoscope (PillCam Crohn's (Medtronic)) was developed, and it can observe the entire digestive tract with a single capsule endoscope. (5) It is mainly applicable for inflammatory bowel disease, such as Crohn's disease (CD), which is functionally similar to CCE-2; however, the number of images taken and the dedicated software used for analysis are different from CCE-2. Unfortunately, SBC capsule endoscopy is not available in Japan. On the day of the presentation, this SBC capsule endoscopy will be introduced and its performance and usefulness will be overviewed. In addition, our recent observational study(6) of pan-enteric exploration for patients after immune checkpoint inhibitor administration using the CCE-2 will be introduced.

References

1. Eliakim R, Fireman Z, Gralnek IM, et al. Evaluation of the PillCam Colon capsule in the detection of colonic pathology: results of the first multicenter, prospective, comparative study. Endoscopy 2006;38:963-970.
2. Van Gossum A, Navas MM, Fernandez-Urien I, et al. Capsule endoscopy versus colonoscopy for the detection of polyps and cancer. The New England journal of medicine 2009;361:264-270.
3. Eliakim R, Yassin K, Niv Y, et al. Prospective multicenter performance evaluation of the second-generation colon capsule compared with colonoscopy. Endoscopy 2009;41:1026-1031.
4. Hall B, Holleran G, McNamara D. PillCam COLON 2(©) as a pan-enteroscopic test in Crohn's disease. World J Gastrointest Endosc 2015;7:1230-2.
5. Leighton JA, Helper DJ, Gralnek IM, et al. Comparing diagnostic yield of a novel pan-enteric video capsule endoscope with ileocolonoscopy in patients with active Crohn's disease: a feasibility study. Gastrointest Endosc 2017;85:196-205.e1.
6. Shimozaki K, Hirata K, Horie S, et al. The Entire Intestinal Tract Surveillance Using Capsule Endoscopy after Immune Checkpoint Inhibitor Administration: A Prospective Observational Study. Diagnostics (Basel) 2021;11.

Session 6-4

Balloon-assisted enteroscopy

Jinsu Kim

Department of Internal Medicine, The Catholic University of Korea, Seoul, Korea

Introduction

Device-assisted enteroscopy (DAE) is commonly used to diagnose and treat untreated gastrointestinal bleeding, to diagnose small bowel tumors, and to diagnose inflammatory growth disorders. However, since the development of the device, the indication has been expanded steadily and has been applied to a variety of diseases such as endoscopic resection of small bowel tumors, small intestine stenosis, and foreign material removal from small bowel. Approximately 70–80% of patients with CD require surgery due to obstructive symptoms within 20 years after diagnosis, with approximately 30% requiring repeat surgeries within 10 years due to recurrence of symptoms. (1) Repeated surgical treatment can cause short bowel syndrome with other various complications such as fistula, leak, and abscess. To prevent such complications, endoscopic balloon dilatation (EBD) has been used as alternative procedure to postpone surgery and showed favorable outcomes with 89 % technical success and 3 % perforation rates. Until recently, most of the studies were conducted on dilatation of primary stricture (colon and terminal ileum) and anastomotic stricture which within reach of conventional colonoscopy. However, there are relatively few studies on EBD of small bowel stricture using DAE.(2,3)

Procedure of endoscopic balloon dilation in CD stricture

The procedure usually performed as followed. 1. Endoscopic approach to the stricture site. 2. Insertion of guidewire over stricture. 3. Insertion of through-the-scope (TTS) balloon catheters along the guidewire tend to be selected for almost all EBD procedures because of their simplicity and safety. The length of the balloons for inflation is about 5 cm; therefore, stenoses 5cm or longer are considered unsuitable for EBD. 4. The dilation procedure is performed with monitoring of the pressure of the inflated balloon using a dilator under fluoroscopic guidance. 5. After dilation check whether intestinal lumen effectively dilated and any complications such as bleeding or severe laceration leading to intestinal perforation. Technical success means successful passage of scope through the dilated stricture. Clinical success means improvement of obstructive symptoms such as nausea, bloating, abdominal pain and vomiting. With regard to EBD technique, the maximum balloon diameter recorded in the studies ranged from 15 to 25 mm, but an increased caliber of dilation neither resulted in increased rates of clinical efficacy nor reduced the need for re dilatation or surgery.

Indications of balloon dilation

Previous guidelines recommend the dilatation when strictures are accessible to endoscopes (these include colonoscopy, enteroscopy, and gastroscopy), ≤5 cm in length, non-angulated lesion, and without contraindications such as presence of fistula, abscess, or malignancy. Bettenworth et al. found that a stricture length of ≤5 cm was associated with a longer surgery-free interval. The rate of technical success of was 89.1%. However, the dilatation of stricture over 5 cm usually unsuitable and every 1 cm increase in stricture length lead to the increase the risk of surgery due to perforation by 8%.(4)technique, the maximum balloon diameter recorded in the studies ranged from 15 to 25 mm, but an increased caliber of dilation neither resulted in increased rates of clinical efficacy nor reduced the need for re dilatation or surgery.

Efficacy of endoscopic balloon dilation using DAE

Fukumoto et al.(5) reported a study on the diagnosis and treatment of SB strictures using DAE. EBD using DAE was performed in 23 patients with CD, with a long-term success rate of 73.9% (17/23). In a retrospective cohort study by Sunada et al.(6), 473 stricture EBD procedures using DAE were performed in 85 patients. The surgery-free rates after the stricture dilatation were 87.3% at 1 year, 78.1% at 3 years, and 74.2% at 5 years. In terms of complications, perforations occurred in 4.5% of patients (4/85), and post-procedure bleeding requiring transfusion occurred in one patient, which was controlled by endoscopic hemostasis. The first multi-center prospective study on the efficacy and safety of EBD using DAE for SB CD strictures was reported by Hirai et al. in 2018.(7) In this study, a total of 112 patients from 23 institutions were enrolled, and EBD was technically successful in 93.7% of patients (89/95). Short-term success, defined as improvement of symptoms related to stricture within 4 weeks, was achieved in 66 patients (69.5%), while adverse events were low and well-managed with conservative treatment. Recently, a systematic review and meta-analysis were published. (8) In the pooled analysis, the technical success rate was 94.8%, clinical efficacy was 83.3%, and major complications occurred at 1.82% per dilatation and 3.21% per patient. In terms of long-term outcomes, the rate of symptom recurrence was 24.8%, 46.8%, and 67.2% at 6, 12, and 24 months after EBD respectively. Endoscopic redilatation after EBD was observed in 31.2%, 45.7%, and 55.4% of patients within 6, 12, and 24 months respectively. The rate of surgical management after EBD was 22.0% and 24.9% at 12 and 24 months respectively.

Surgery Versus EBD for stricturing CD

In a study, the proportion of patients who required any reintervention during follow-up was significantly lower in the surgical group. The need for surgery/resurgery during follow up was also significantly lower in the surgically treated group. However, complications such as intra- abdominal abscess, surgical site infections, enterocutaneous fistula, anastomotic leak were higher in surgical group.(9)

Conclusions

Considering the above results, EBD using DAE in Small bowel CD strictures is a reasonably safe and effective procedure and postpones the need for surgery when it is applied in cases with appropriate indications.

References

1. Cosnes J, Gower-Rousseau C, Seksik P, Cortot A. Epidemiology and natural history of inflammatory bowel diseases. Gastroenterology. 2011;140:1785-1794.
2. Alexander-Williams J, Haynes IG. Conservative operations for Crohn's disease of the small bowel. World J Surg. 1985;9:945-951.
3. Lee EC, Papaioannou N. Minimal surgery for chronic obstruction in patients with extensive or universal Crohn's disease. Ann R Coll Surg Engl. 1982;64:229-233.
4. Bettenworth D, Gustavsson A, Atreja A et al. A pooled analysis of efficacy, safety, and long-term outcome of endoscopic balloon dilation therapy for patients with stricturing Crohn's disease. Inflamm. Bowel Dis. 2017; 23: 133–142.
5. Fukumoto A, Tanaka S, Yamamoto H, et al. Diagnosis and treatment of small-bowel stricture by double balloon endoscopy. Gastrointest Endosc. 2007;66:S108-S112.
6. Sunada K, Shinozaki S, Nagayama M, et al. Long-term Outcomes in Patients with Small Intestinal Strictures Secondary to Crohn's Disease After Double-balloon Endoscopy-assisted Balloon Dilation. Inflamm Bowel Dis. 2016;22:380-386.
7. Hirai F, Andoh A, Ueno F, et al. Efficacy of Endoscopic Balloon Dilation for Small Bowel Strictures in Patients With Crohn's Disease: A Nationwide, Multi-centre, Open-label, Prospective Cohort Study. J Crohns Colitis. 2018;12:394-401.
8. Bettenworth D, Bokemeyer A, Kou L, et al. Systematic review with meta-analysis: efficacy of balloon-assisted enteroscopy for dilation of small bowel Crohn's disease strictures. Aliment Pharmacol Ther. 2020;52:1104-1116.
9. Greener T, Shapiro R, Klang E, et al. Clinical Outcomes of Surgery Versus Endoscopic Balloon Dilation for Stricturing Crohn's Disease. Dis Colon Rectum. 2015;58(12):1151-1157.

Session 6-5

Surgical approach and findings of Crohn's disease

Min Soo Cho

Division of Colon and Rectal Surgery, Department of Surgery, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Introduction

Crohn's disease is a chronic inflammatory condition of uncertain etiology that affects the entirety of alimentary tract. Conservative medical therapy is still regarded as the principal therapeutic approach to treat most patients while surgical approach is reserved for patients who fail medical treatment or develop severe complications. At present, 80% of patients with Crohn's disease require at least one operation, and 40% will require multiple surgeries. This presentation aimed to review various surgical options and its findings in complicated Crohn's disease.

Operative options

1. Bypass surgery

Bypass surgeries including internal and external bypass are still considered reasonable or desirable options for selective cases.

2. Intestinal resection

Bowel resection is the procedure of choice for Crohn's disease of the small bowel, especially when it is the patient's first operation. Despite the high recurrence rates, segmental resection with ileocolic, ileorectal, colocolic, or colorectal anastomosis provides years of stoma-free life for many patients with Crohn's colitis

3. Strictureplasty

Bowel resection is the procedure of choice for Crohn's disease of the small bowel, especially when it is the patient's first operation. Despite the high recurrence rates, segmental resection with ileocolic, ileorectal, colocolic, or colorectal anastomosis provides years of stoma-free life for many patients with Crohn's colitis

Surgical indications

Surgical indications for Crohn's disease can be subgrouped into one of two groups; elective indications and emergent/urgent indications. Elective indications include fistula with or without abscess, obstruction, failed medical therapy, and malignancy. For emergent indications include bowel perforation, hemorrhage, and toxic colitis. The incidence of these indications varies according to anatomic pattern, disease extent, and behavioral pattern. However, fistula, abscess, and obstruction with stricture tend to be the most common reasons for surgery in Crohn's disease.

1. Fistula and abscess

Several different types of fistula can develop including enteroenteric, enterovesical, enterovaginal, enterocutaneous, perianal, and perirectal. Similarly, abscesses can occur in various sites: enteroparietal, interloop, intramesenteric, and retroperitoneal.

2. Obstruction

Bowel obstruction can be acute or chronic and arise from single or multiple sites of stricturing. Although obstructive symptoms might improve with high-dose corticosteroids, the response is often temporary and symptoms typically recur as the medication is tapered. Moreover, high-grade obstructive lesions usually do not respond to medical therapy and early operative intervention is recommended before symptoms worsen or perforation occurs.

3. Perforation and bleeding

Free perforation, although rare, usually occurs during an acute exacerbation of chronic disease, particularly in the presence of distal obstruction, or during transmural ulceration has developed. The transmural ulcers of Crohn's disease more typically result in formation of inflammatory adhesions between the diseased segment and surrounding structures that seal most perforations. However, the resultant abscess may subsequently rupture, spill its contents, and create a communication between the bowel lumen and the peritoneal cavity. Additionally, the deep ulcers can erode into moderate-sized vessels of the mucosa or submucosa leading to massive intestinal hemorrhage.

Conclusions

Crohn's disease continues to be an incurable inflammatory disorder of the alimentary tract that also affects extra-intestinal sites. Although medical therapy has become more specific and effective with better understanding of disease pathogenesis, surgical approach still need for the majority of patients with complicated disease. Surgical options will continue to prominently impact the care of patients with Crohn's disease until the recurrent nature of the disease is better managed.

Session 7-1

Endoscopic diagnosis of small bowel tumor

Eun Ji Shin

Associate Professor of Medicine, The Johns Hopkins University School of Medicine, USA

Educational Background

1993-1997	B.A., Biology, Harvard University, Cambridge, MA; graduated summa cum laude
1997-2001	M.D., Medicine, Duke University School of Medicine, Durham, NC
2006-2014	Ph.D., Graduate Training Program in Clinical Investigation, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

Professional Career

- Residency, Internal Medicine, Johns Hopkins Hospital, Baltimore, MD
- Fellowship, Gastroenterology and Hepatology, Johns Hopkins Hospital, Baltimore, MD
- Fellowship, Advanced Therapeutic Endoscopy, Johns Hopkins Hospital, Baltimore, MD

Research Field

- GI oncology, Barrett's esophagus, pancreatobiliary disease, and therapeutic endoscopy

Session 7-2

Radiological diagnosis of small bowel tumors

Jin Sil Kim

Department of radiology, Ewha Womans University Mokdong Hospital, College of Medicine, Ewha Womans University, Seoul, Korea

Introduction

Radiology examinations play a major role in the diagnosis of small bowel tumors and are complementary to endoscopic techniques. Multidetector CT (MDCT) and magnetic resonance imaging (MRI) are gradually replacing conventional barium radiography as the tool of choice [1]. Diagnosis of small bowel tumors is a challenge due to low incidence of disease, nonspecific clinical manifestation, difficult endoscopic access, low index of clinical suspicion, lack of mucosal abnormality, and subtle radiologic features [2, 3]. However, various small bowel tumors have characteristic imaging features at the radiological examination. Understanding the imaging features of small bowel tumors is important to diagnose and characterize small bowel tumors. This lecture focus on state-of-the-art cross-sectional imaging techniques to diagnose small bowel tumors and the characteristic imaging features of each small bowel tumor.

Potential imaging tests for small bowel tumors

1. Barium fluoroscopy: Small bowel follow-through and barium enteroclysis

2. Cross-sectional imaging: CT and MR enterography and enteroclysis

Compared with barium fluoroscopy, CT and MR also have an advantage of multi-planar imaging with lack of superimposition and ability to evaluate the mesentery. CT and MR have ability to directly evaluate the tumor extension and tumor metastasis. Because enteroclysis may cause substantial patient discomfort as it requires small bowel intubation, nowadays CT and MR enterography are the dominant techniques for evaluating small bowel tumors in the radiologic field. Compared to MRE, CTE has a shorter examination time, superior spatial resolution, less susceptibility to motion artifacts, lower cost; greater safety in patients with pacemakers or implanted devices sensitive to MRI, Greater radiologist confidence and interpretation experience, and Excellent evaluation of other organs. On the other hand, CTE has an ionizing radiation issue, more side effects of CT iv contrast than that of MR contrast, and less soft-tissue contrast. MRE also has the the availability of cine-imaging techniques and the availability of qualitative and quantitative techniques, such as DWI [4] (Table 1).

Small bowel malignancies

The five most common small bowel malignancies are adenocarcinoma, carcinoid tumor, GIST, lymphoma, and metastasis. Neoplasm is considered mainly when the small bowel shows focal, irregular, asymmetric heterogeneous wall thickening. Small or well-differentiated adenocarcinoma may show regular symmetric focal wall thickening. Segmental or diffuse wall thickening is usually a benign disease, but this finding can be found in lymphoma as an exception (Table 2) [5, 6].

1. Small bowel adenocarcinoma

It is more common in men and usually occurs at about age 60. It most frequently arises in the duodenum. Small bowel adenocarcinoma showed various radiologic findings. The most representative radiology feature is the annular constricting mass accompanied with luminal narrowing and upstream bowel dilatation. Even with small encircling adenocarcinoma, adenocarcinoma usually has prominent intratumoral desmoplasia, accompanied by small bowel obstruction. It may present as a rounded or lobulated polypoid mass, or a noncircumferentail ulcerative fungating mass. An enhancement pattern for small bowel adenocarcinoma is the replacement of normal stratification of the thickened bowel wall, Moderate heterogeneous enhancement, Progressive and delayed enhancement until the venous phase [7, 8].

2. Lymphoma

Small bowel lymphomas are typically larger than adenocarcinomas and demonstrate only mild to moderate enhancement. Morphologically, small bowel lymphomas most often present with segmental bowel wall thickening, which can occur as a single lesion or involving multiple nearby small bowel loops. Segmental small bowel wall thickening with aneurysmal ulceration invariably represents lymphoma. Mesenteric adenopathy, diffuse mesenteric fat infiltration, and ascites can be seen [1].

3. Gastrointestinal stromal tumor (GIST)

The GIST is a sub-epithelial tumor with a rounded small bowel mass with exo-enteric and intraluminal components and avid enhancement. High-grade or malignant tumors often include ulceration or internal necrosis [9]. Sporadic cases often show a single mass, but familial GIST shows multifocality.

4. Carcinoid tumor

It most frequently arises in the distal ileum and can be multifocal [10]. Detection of primary carcinoid tumor in the small bowel is difficult with conventional imaging because of the small size of the primary tumor and its location in the submucosa. More often, a

Conclusions

Understanding radiologic modality for evaluation of small bowel tumors and imaging characteristics of small bowel tumors is helpful for diagnosis of small bowel tumors. CT enterography and MR enterogrphay are the cross-sectional imaging studies of choice for many small bowel tumors. Adenocarcinoma usually appears as an annular constricting mass accompanied by obstruction. NHLs are usually large and present with aneurysmal dilatation and adenopathy. Malignant GIST tends to appear as a large, bulky, predominantly exophytic mass. Carcinoids are well-enhancing and appear as a speculated mesenteric mass. The most crucial step is to prioritize detection for the evaluation of small bowel tumors.

References

1. E.A. Williams, A.W. Bowman, Multimodality imaging of small bowel neoplasms, Abdominal Radiology 44(6) (2019) 2089-2103.
2. S.Y. Pan, H. Morrison, Epidemiology of cancer of the small intestine, World journal of gastrointestinal oncology 3(3) (2011) 33.
3. H.-K. Chang, E. Yu, J. Kim, Y.K. Bae, K.-T. Jang, E.S. Jung, G.S. Yoon, J.M. Kim, Y.-H. Oh, H.-I. Bae, Adenocarcinoma of the small intestine: a multi-institutional study of 197 surgically resected cases, Human pathology 41(8) (2010) 1087-1096.
4. S.H. Kim, Computed tomography enterography and magnetic resonance enterography in the diagnosis of Crohn's disease, Intestinal Research 13(1) (2015) 27.
5. T. Fernandes, M.I. Oliveira, R. Castro, B. Araújo, B. Viamonte, R. Cunha, Bowel wall thickening at CT: simplifying the diagnosis, Insights into imaging 5(2) (2014) 195-208.
6. R.M. Gore, M.S. Levine, Textbook of gastrointestinal radiology e-book, Elsevier Health Sciences2014.
7. R.M. Gore, U.K. Mehta, J.W. Berlin, V. Rao, G.M. Newmark, Diagnosis and staging of small bowel tumours, Cancer Imaging 6(1) (2006) 209.
8. J.S. Kim, S.H. Park, S. Hansel, J.G. Fletcher, Imaging and screening of cancer of the small bowel, Radiologic Clinics 55(6) (2017) 1273-1291.
9. J.A. Crosby, C.N. Catton, A. Davis, J. Couture, B. O'Sullivan, R. Kandel, C.J. Swallow, Malignant gastrointestinal stromal tumors of the

small intestine: a review of 50 cases from a prospective database, Annals of surgical oncology 8(1) (2001) 50-59.
10. S.N. Pinchot, K. Holen, R.S. Sippel, H. Chen, Carcinoid tumors, The oncologist 13(12) (2008) 1255-1269.

Table 1. The advantages and disadvantages of CT enterography and MR enterography.

	CTE	MRE
Advantage	Shorter examination times of 1BH per phase Superior spatial resolution of 2-3mm Less susceptibility to motion artifacts Lower cost Greater safety in patients with pacemakers or implanted devices sensitive to MRI Greater radiologist confidence and interpretation experience Excellent evaluation of other organs	Absence of ionizing radiation Superior soft tissue contrast resolution The availability of cine-imaging techniques The availability of qualitative and quantitative techniques, such as DWI
Disadvantage	Ionizing radiation Intravenous contrast Less soft tissue contrast	Longer acquisition times of 30–60 minutes Inferior spatial resolution of 4–6 mm Greater numbers of artifacts associated with peristalsis and bowel gases More expensive Requires more expertise (more variable) More limited evaluation of other organs

Table 2. Radiologic characteristics of small bowel malignancies.

Neoplasm	Location	Enhancement	Obs.	Other features
Adenocarcinoma	Periampullary	Variable	+	Apple core (Annular, constricting)
NHL	Prox. jejunum	Usually similar or less than mucosa	-	Often large; May show aneurysmal dilation Often with adenopathy
GIST	Ileum	Intense/homogenous	-	Usually no adenopathy May show liver or mesenteric metastases
Carcinoid	Jejunum	Intense/homogenous	-	Spiculated mesenteric mass Hypervascular liver metastases

Session 7-3

Endoscopic management of sporadic and familial duodenal adenoma: Confusion, conundrum, and cautions

Jeffrey Lee

Department of Gastroenterology, Hepatology, and Nutrition,
MD Anderson Cancer Center, Houston, Texas, USA

Introduction

Duodenal polyps can present sporadically or as a part of familial adenomatosis polyposis (FAP) syndrome. While it is postulated that the adenoma to carcinoma progression sequence of colorectal cancer is the same observed phenomenon in small bowel tumors, the pathogenesis of small intestinal adenomas and adenocarcinomas is poorly characterized. Moreover, it remains unclear how fast an adenoma in the duodenum progresses to carcinoma. However, 30-85% of duodenal adenomas will eventually undergo malignant transformation. While there is a robust body of evidence on the endoscopic management of colonic polyps, data on outcomes of large duodenal polyps managed endoscopically are scarce.

Sporadic and familial duodenal adenomas

While the rate of duodenal adenomas found incidentally has increased in parallel with the increasing number of esophagogastroduodenoscopies (EGD)s performed, the overall prevalence of duodenal adenoma ranges from 0.03 to 0.4% in EGDs. The majority of duodenal adenomas are associated with FAP. In FAP which occurs in 1 in 10,000 general population, the incidence of adenomas ranges from 30 to 92% and the duodenal cancer risk is 100-330-fold higher than in non-FAP. The absolute lifetime risk for duodenal cancer in FAP is around 5%, necessitating the initial EGD at the age of 25 with forward- and side-viewing scopes (to examine the ampulla as well). In both sporadic and FAP patients, most duodenal polyps are found in the 2nd and 3rd portions of the duodenum.

Endoscopic management of sporadic and familial duodenal adenomas

The endoscopic resection of large duodenal adenomas continues to be challenging even for the most skilled endoscopists. This is mainly due to the thin nature of the duodenal wall and difficulty in closing the mucosal defect after resection that pose potential risks of complications from endoscopic resection, mainly bleeding and immediate or delayed perforation. Duodenal perforation of a significant size (> 2cm) is challenging to manage not only by endoscopic methods but also with a surgical approach. Emergent surgery for duodenal perforation may not achieve complete primary closure of the area, requiring the placement of multiple drains in the retroperitoneum over a recovery period of several months. Despite these invasive measures, definitive treatment may eventually require a pancreatoduodenectomy when perforation occurs in the medial wall near the ampulla.

Endoscopic mucosal resection (EMR) can be performed as the traditional technique of submucosal injection of a solution (saline or other lifting agents) followed by snare electric cautery resection (standard EMR), cap-assisted EMR, or underwater EMR with en block resection rate of 61, 92, and 75% respectively. In one study, bleeding was noted in all three methods (9, 2, and 2 % respectively), but in cap-assisted EMR, perforations were seen in 4% of the patients, underlining the importance of applying controlled suction when performing the procedure.1 When compared with EMR, ESD provides a significantly higher rate of en bloc resection, but the perforation rate is also significantly higher. Endoscopic full-thickness resection allows resection of the lesion adhering to the muscularis propria with a technical success rate of 80-100% and a low rate of complications.

In general, delayed perforation is more difficult to manage often requiring surgical intervention, To reduce the risk of delayed perforation, closure of the mucosal defects after endoscopic resection is desirable using one or a combination of the following devices or techniques; through-the-scope clip, over-the-scope clip, endo-suturing, and/or polymer gel application.

Conclusions

With steady advances in endoscopic techniques and devices over the past decades, the endoscopic intervention has largely supplanted common surgical approaches of the past. Yet, endoscopic resection of large duodenal polyps is still arduous imposing ample training and a multidisciplinary approach in carefully selected patients.

Before embarking on endoscopic resection of large duodenal polyps, one should first become proficient in closing mucosal defects. Considering the high rate of perforation, ESD in the duodenum should be reserved for experts. In this lecture, we will review the characteristics of the patients with large duodenal polyps, techniques involved in managing the patients, procedure outcomes, complications, and recurrence.

References

1. Okimoto K, Maruoka D, Matsumara T, et al. Gastointest Endosc 2022;95(1):140-148.

Session 7-4

Surgical removal of small bowel tumor

Inja Park

Department of Colon and Rectal Surgery, University of Ulsan College of Medicine and Asan Medical Center, Seoul, Korea

Introduction

Small bowel tumor is very rare. It is usually diagnosed after advanced status because it shows non-specific clinical symptoms. Sometimes, we have experienced incidental identification of small bowel tumors in early stage with an abdominal CT scan for another purpose. A preoperative biopsy is usually not possible for small bowel tumors. Surgery is the best treatment for removing benign intestinal tumors and is the only treatment that can cure small intestinal cancer. According to clinical diagnosis, some points to be careful during surgery. This topic will present the principle of surgery and related complications for small bowel tumors.

Surgery of small bowel tumor

1. Benign tumor

Benign tumors were usually found incidentally during exploration but sometimes would cause obstruction or bleeding. Leiomyoma, adenomatous polyp, lipoma, and hemangioma are common small bowel benign tumors. It can be removed with small bowel resection and anastomosis when it is enough away for anastomosis from Treitz ligament and ileocecal valve. Villous adenoma, a precancerous lesion, is commonly found in the duodenum. If it is confirmed benign, excision including mucosa and submucosa via duodenotomy is recommended. When the tumor is large, pancreaticoduodenectomy is required. Segmental resection and duodenojejunal anastomosis can be applied for lesions locating the 3rd-4th portion of the duodenum.

2. Malignant tumor

The type of commonly occurring tumors differs according to the small bowel segment. Adenocarcinoma is the most common small bowel malignant tumor and frequently occurs in the duodenum, followed by the jejunum. Neuroendocrine tumor (NET) is most commonly identified at the ileum and similar in the jejunum. Lymphoma developed in the jejunum mostly.

Adenocarcinoma of the small bowel is usually diagnosed in advanced status with lymph node enlargement, which tends to be metastatic. Surgical treatment of small bowel adenocarcinoma is determined according to tumor location. Localized invasive adenocarcinomas of the small bowel are best managed with wide segmental surgical resection. Jejunal and ileal tumors are resected with sufficient resection margin (longer than 5 cm) and investing mesentery, including the regional nodes at risk for metastases, which provides essential staging information that impacts decisions regarding the need for adjuvant therapy. Sometimes, however, it is difficult to resect adequate mesentery because proximity of the nodes or tumor close to the superior mesenteric artery.

Tumors located in the terminal ileum require ileum and colon resection together, which hemicolectomy. Pancreaticoduodenectomy is required for tumors involving the second portion of the duodenum and those invading any portion of the ampulla or pancreas. For tumors involving the first, third, and fourth portions of the duodenum, Although there is debate regarding the need for pancreaticoduodenectomy compared with wide local excision for tumors involving other portions of duodenum, most studies demonstrate similar outcomes between pancreaticoduodenectomy and wide local excision:

Although gastrointestinal stromal tumor (GIST) can arise in any portion of the GI tract, from the esophagus to the rectum, the

small bowel is the second most common site of involvement (30%–40%), after the stomach (40%–60%). The diagnosis of GIST of the small bowel may be delayed for several reasons, including its relatively low incidence, non-specific and variable symptoms, the wide spectrum of radiological appearances, intestinal thickening, and the presence of overlapping loops of the intestine, which make imaging studies difficult; all of these lead to delayed or misdiagnosis of GIST of the small bowel. Therefore, it was removed by small bowel segmental resection.

NET is usually small (less than 2cm in diameter) and multiple; careful exploration is required during surgery. Segmental resection, including primary tumor and mesentery, is done for NET in the jejunum and ileum. Duodenal NET is removed with local excision/segmental resection for small tumors, but pancreaticoduodenectomy may be required for large tumors. However, complete resection is not possible because of severe local invasion; tumor resection as much as helps delay carcinoid syndrome. In addition, liver resection helps prevent carcinoid syndrome if resection is possible.

Lymphoma can occur as primary intestinal lymphoma or intestinal symptom of systemic lymphoma. Surgery of small bowel lymphoma also included segmental resection. Primary tumor resection is usually recommended to prevent perforation or bleeding, even in patients with distant metastasis.

Leiomyosarcoma frequently results in intestinal bleeding because the tumor outgrowth blood supply and makes central necrosis and mucosal ulcer. The principle of treatment is surgical resection with sufficient resection margin. It usually develops hematogenous metastasis; lymph node removal was not significant.

Surgical complications

Leakage, infection, and bleeding are usual surgical complications after segmental small bowel resection. The small bowel is abundant in blood supply; leakage is not frequent. However, we must be careful if an obstruction is accompanied preoperatively because the bowel wall is edematous and fragile. According to resected segment, trouble absorption of digestion or bowel habit change can occur. When remained small bowel segment is too short (usually less than 1m), short bowel syndrome can occur, and one needs to consider how long the segment would be preserved after surgery. Especially, small bowel tumors were close to the superior mesenteric artery/vein; great care is needed not to cause damage to them which might cause short bowel syndrome.

Session 8-1

Multidisciplinary strategy of solitary large HCC

Su Jong Yu

Department of Internal Medicine and Liver Research Institute, Seoul National University College of Medicine, Seoul, Korea

Currently, controversies exist on staging and management of solitary large (≥ 5 cm) hepatocellular carcinoma (HCC). According to the Barcelona Clinic Liver Cancer (BCLC) staging system, which is widely used for treatment allocation, hepatic resection is considered the treatment of choice for solitary large (≥ 5 cm) HCC without macrovascular invasion or extrahepatic spread (1, 2). These patients are beyond the Milan criteria; liver transplantation is not recommended as the first treatment choice because of the risk of recurrence and the scarcity of donors (3). Ablative therapies, such as percutaneous ethanol injection and radiofrequency ablation (RFA), rarely achieve complete necrosis in tumors > 3cm (4-6). Transarterial chemoembolization (TACE) has been investigated as an alternative for large HCC, but a meta-analysis reported the clinical outcome to be worse than that of hepatic resection (7). Consequently, hepatic resection is considered the only potentially curative treatment for these patients. Nevertheless, few patients are candidates for hepatic resection because of associated liver cirrhosis and the risk of inducing postoperative liver decompensation (8). Although perioperative mortality of hepatic resection in cirrhotic patients has decreased, candidates must be selected carefully to avoid life-threatening complications (9). The long-term outcome of hepatic resection remains poor, mainly because tumors often recur after resection (10). Large tumor size has proven to be related to poor post-surgical outcomes (11, 12), high probability of vascular invasion and a poor histological differentiation (13, 14), with the 5-year disease-free survival rate ranging from 20.0% to 41.3% even after curative resection (12, 15). Moreover, solitary large (≥ 5cm) tumor showed significantly worse survival than other BCLC stage A, which indicate that single tumor should be differently staged according to their tumor size (16). For these reasons, whether hepatic resection is the optimal treatment for large single HCCs is a matter of debate. Therapeutic strategies and good prognostic factors are important for these patients. The responsiveness of HCC to radiation, while long recognized, has been limited by nontargeted tissue exposure and radiation injury. However, in a single institution phase II study, stereotactic body radiotherapy (SBRT) to unresectable large HCC (median size 7.5 cm, range 5.1-9.7 cm) provided excellent local control (92% at 1 year) with acceptable toxicities (17). With the development of advanced microcatheters and short radius of emission of Y90, single lesions confined to particular liver segments may now be approached with superselective radiotherapy, permitting ablative doses to a confined liver volume. Transarterial radioembolization (TARE) allows accurate tumor targeting while sparing surrounding parenchyma, resulting in down-staging potential and bridging-to-transplantation strategies. A prospective clinical trial is ongoing to assess the efficacy and safety of neoadjuvant TARE to down-stage in solitary large (≥ 5cm, long diameter) HCC treated with resection (NCT05038397). Another clinical trial is ongoing to examine the effects of neoadjuvant combination therapy of lenvatinib and TACE for transplant-eligible large HCC patients (NCT05171335). Multidisciplinary strategy including hepatic resection, intra-arterial therapy, radiotherapy and systemic therapies should be considered for these patients to improve their prognosis.

References

1. Reig M, Forner A, Rimola J, Ferrer-Fabrega J, Burrel M, Garcia-Criado A, et al. BCLC strategy for prognosis prediction and treatment recommendation: The 2022 update. J Hepatol. 2022;76(3):681-93.
2. Heimbach JK, Kulik LM, Finn RS, Sirlin CB, Abecassis MM, Roberts LR, et al. AASLD guidelines for the treatment of hepatocellular carcinoma. Hepatology. 2018;67(1):358-80.

3. Sala M, Llovet JM, Vilana R, Bianchi L, Sole M, Ayuso C, et al. Initial response to percutaneous ablation predicts survival in patients with hepatocellular carcinoma. Hepatology. 2004;40(6):1352-60.
4. Khan KN, Yatsuhashi H, Yamasaki K, Yamasaki M, Inoue O, Koga M, et al. Prospective analysis of risk factors for early intrahepatic recurrence of hepatocellular carcinoma following ethanol injection. J Hepatol. 2000;32(2):269-78.
5. Lu DS, Yu NC, Raman SS, Limanond P, Lassman C, Murray K, et al. Radiofrequency ablation of hepatocellular carcinoma: treatment success as defined by histologic examination of the explanted liver. Radiology. 2005;234(3):954-60.
6. Ishizawa T, Hasegawa K, Aoki T, Takahashi M, Inoue Y, Sano K, et al. Neither multiple tumors nor portal hypertension are surgical contraindications for hepatocellular carcinoma. Gastroenterology. 2008;134(7):1908-16.
7. Stevens CL, Awad A, Abbas SM, Watters DAK. Systematic review and meta-analysis of hepatic resection versus transarterial chemoembolization for solitary large hepatocellular carcinoma. HPB (Oxford). 2017;19(8):653-8.
8. Llovet JM, Bruix J. Novel advancements in the management of hepatocellular carcinoma in 2008. J Hepatol. 2008;48 Suppl 1:S20-37.
9. Antman EM, Wiviott SD, Murphy SA, Voitk J, Hasin Y, Widimsky P, et al. Early and late benefits of prasugrel in patients with acute coronary syndromes undergoing percutaneous coronary intervention: a TRITON-TIMI 38 (TRial to Assess Improvement in Therapeutic Outcomes by Optimizing Platelet InhibitioN with Prasugrel-Thrombolysis In Myocardial Infarction) analysis. J Am Coll Cardiol. 2008;51(21):2028-33.
10. Cho Y, Sinn DH, Yu SJ, Gwak GY, Kim JH, Yoo YJ, et al. Survival Analysis of Single Large (>5 cm) Hepatocellular Carcinoma Patients: BCLC A versus B. PLoS One. 2016;11(11):e0165722.
11. Fuster J, Garcia-Valdecasas JC, Grande L, Tabet J, Bruix J, Anglada T, et al. Hepatocellular carcinoma and cirrhosis. Results of surgical treatment in a European series. Ann Surg. 1996;223(3):297-302.
12. Hanazaki K, Kajikawa S, Shimozawa N, Shimada K, Hiraguri M, Koide N, et al. Hepatic resection for large hepatocellular carcinoma. Am J Surg. 2001;181(4):347-53.
13. Choi GH, Han DH, Kim DH, Choi SB, Kang CM, Kim KS, et al. Outcome after curative resection for a huge (>or=10 cm) hepatocellular carcinoma and prognostic significance of gross tumor classification. Am J Surg. 2009;198(5):693-701.
14. Pawlik TM, Delman KA, Vauthey JN, Nagorney DM, Ng IO, Ikai I, et al. Tumor size predicts vascular invasion and histologic grade: Implications for selection of surgical treatment for hepatocellular carcinoma. Liver Transpl. 2005;11(9):1086-92.
15. Ramacciato G, Mercantini P, Petrucciani N, Ravaioli M, Cucchetti A, Del Gaudio M, et al. Does surgical resection have a role in the treatment of large or multinodular hepatocellular carcinoma? Am Surg. 2010;76(11):1189-97.
16. Park YK, Song SK, Kim BW, Park SK, Chung CW, Wang HJ. Prognostic significance of microvascular invasion in tumor stage for hepatocellular carcinoma. World J Surg Oncol. 2017;15(1):225.
17. Beaton L, Dunne EM, Yeung R, Rackley T, Weber B, Mar C, et al. Stereotactic Body Radiotherapy for Large Unresectable Hepatocellular Carcinomas - A Single Institution Phase II Study. Clin Oncol (R Coll Radiol). 2020;32(7):423-32.

Session 8-2

Surgical management of solitary large HCC

Dong Jin Joo

Department of Surgery, Yonsei University College of Medicine, Seoul, Korea

Large hepatocellular carcinoma (HCC) shows poor prognosis. However, according to the 8th AJCC, a single large HCC without vascular invasion is no longer considered an unfavorable tumor. Also, BCLC guideline 2022 described that larger tumors may still benefit from resection as size alone should not be considered a limiting factor for surgical resection, as long as imaging has not identified vascular invasion and the remnant liver volume permits adequate postoperative liver function. Japanese HCC guidelines include surgical resection in the treatment option for the single HCC regardless of the tumor size.

There were several studies to show that tumor size is an independent predictor for poor prognosis in HCC recurrence and survival after liver resection. The reason of these results were thought be that the larger tumor size, the more chance to have vascular invasion and intrahepatic metastasis. That is why we should consider tumor biology when we decide to do liver resection for large HCC such as tumor markers. To check or change the tumor biology, down-staging before resection could be another option for huge HCC with vascular invasion. However, there has not been enough evidence to prove the effect of down-staging for HCC yet.

Even though several reports showed good results of liver resection for single large HCC, we should consider various factors before liver resection including liver function, tumor size, remnant liver volume, and tumor biology.

References

1. Reig M, Forner A, Rimola J, Ferrer-Fabrega J, Burrel M, Garcia-Criado A, et al. BCLC strategy for prognosis prediction and treatment recommendation: The 2022 update. Journal of hepatology. 2022;76(3):681-93.
2. Lucatelli P, Guiu B. 2022 Update of BCLC Treatment Algorithm of HCC: What's New for Interventional Radiologists? Cardiovascular and interventional radiology. 2022;45(3):275-6.
3. Hallemeier CL, Apisarnthanarax S, Dawson LA. BCLC 2022 update: Important advances, but missing external beam radiotherapy. Journal of hepatology. 2022;76(5):1237-9.
4. Zheng J, Shen S, Jiang L, Yan L, Yang J, Li B, et al. Outcomes of anterior approach major hepatectomy with diaphragmatic resection for single huge right lobe HCC with diaphragmatic invasion. Medicine. 2018;97(36):e12194.
5. Aghemo A. Update on HCC Management and Review of the New EASL Guidelines. Gastroenterology & hepatology. 2018;14(6):384-6.
6. Zhang ZM, Zhang YM, Gao S, Yuan WP, Zhao YN, Xiang BD, et al. Treatment efficacy and prognostic factors for huge HCC based on Barcelona Clinic Liver Cancer staging. Asian Pacific journal of cancer prevention : APJCP. 2014;15(20):8823-8.
7. Lee HS, Choi GH, Joo DJ, Kim MS, Choi JS, Kim SI. The clinical behavior of transplantable recurrent hepatocellular carcinoma after curative resection: implications for salvage liver transplantation. Annals of surgical oncology. 2014;21(8):2717-24.
8. Huang J, Hernandez-Alejandro R, Croome KP, Zeng Y, Wu H, Chen Z. Hepatic resection for huge (>15 cm) multinodular HCC with macrovascular invasion. J Surg Res. 2012;178(2):743-50.
9. Kokudo N, Makuuchi M. Evidence-based clinical practice guidelines for hepatocellular carcinoma in Japan: the J-HCC guidelines. Journal of gastroenterology. 2009;44 Suppl 19:119-21.
10. Choi GH, Han DH, Kim DH, Choi SB, Kang CM, Kim KS, et al. Outcome after curative resection for a huge (>or=10 cm) hepatocellular carcinoma and prognostic significance of gross tumor classification. Am J Surg. 2009;198(5):693-701.
11. Kobayashi A, Pulitano C. Treatment of huge HCC: extending the indications for liver resection. Annals of surgical oncology. 2008;15(5):1549; author reply 50.

Session 8-3

TACE of solitary large HCC

Toshihiro Tanaka

Dept. of Diagnostic and Interventional Radiology, Nara Medical University, Kashihara, Japan

Introduction

Recently, although advances in diagnostic imaging techniques and the widespread application of screening programs for high-risk groups have facilitated the detection of small HCC, large size HCC is still occasionally discovered. Although hepatectomy is the best therapeutic potion, curative resection has been performed for only limited numbers of patients due to severe tumor extension, and poor liver function. TACE is the main alternative therapy instead of surgery. However, TACE for large HCC is challenging due to the following reasons; Firstly, large amounts of embolic materials is needed to occlude the tumor feeding artery and the frequent recanalization could develop after TACE. Secondly, severe post embolization syndrome could occur. In this lecture, several TACE techniques are introduced to perform TACE effectively and safely for large HCC. Also, the results in published literatures will be shown.

Bland TAE Followed by Conventional TACE

The dose of Lipiodol used for selective or superselective TACE state that the average dose (mL) of Lipiodol is roughly equal to the tumor diameter (cm) to obtain a good therapeutic effect. However, more than such a predicted amount of Lipiodol is needed for large HCC, since a tumor with a diameter of 10 cm has a volume of 500 ml. On the other hand, use of a large amount of Lipiodol may cause the following complications.

To overcome these limitations, the technique of bland-TAE followed by cTACE was reported. As the first step, bland-TAE without anticancer agents is performed by using gelatin sponge particles or Embosphere to reduce tumor vascular bed. Then, as the second step, cTACE is performed for the residual viable portion.

Results of bland TAE followed by cTACE for huge HCC over 10cm in diameter was reported. The tumor response at 3 months after cTACE, CR in 38.1% and PR in 57.1% of cases. The median OS was 2.7 years, and the 1-, 2-, 3-, and 5-year OS rates were 76.2%, 66.7%, 42.9%, and 25.0%, respectively. Although severe complications were not reported in this literature, acute tumor-lysis syndrome could be one of the most catastrophic complications following the bland-TACE.

Stepwise cTACE

Miyayama reported stepwise cTACE, which can reduce the volume of Lipiodol per one TACE session to avoid the complications related to too much volume of Lipiodol. The maximum doze of Lipiodol in a single cTACE session was limited to ≤10 mL to minimize adverse effects. Approximately one-third to half of the tumor is completely embolized in a superselective fashion and the residual tumor portions are treated at the next cTACE. This is the concept of stepwise cTACE.

The results of stepwise cTACE for huge HCC over 10cm in diameter were the OS rates at 1, 3, and 5 years were 68, 34.7, and 23.1%, respectively. A tumor number of three was a significant prognostic factor (P = 0.020) and the 1-, 3-, and 4-year OS rates in patients with ≤3 and≥4 tumors were 81.3 and 33.3, 55.6 and 11.1, and 38.9% and 0%, respectively.

DEB-TACE

Previously, effectiveness of DEB-TACE for large HCC was reported. Mukund et al. reported theOS was 28 months. OS rates at 1 and 2 years were 92% and 57%, respectively.

Chen et al. reported compared with cTACE alone, DEB□TACE combined with cTACE significantly increased the objective response rate at 1 and 3 months after the treatment of unresectable large HCCs, and had a longer TTP, without any significant increase in the number of severe complications.

Huang et al. reported DEB-TACE with HAIC was tolerable and led to better OS than DEB-TACE in patients with large or huge HCC.

Conclusions

Previously, several useful TACE techniques were reported in a treatment of large HCC. Although these results showed high response rate and long OS. Further improvement can be expected by using current antiangiogenics, i.e. Lenvatinib, before TACE to enhance TACE effects.

References

1. Hidaka, et al. Efficacy of combined bland embolization and chemoembolization for huge (≥10 cm) hepatocellular carcinoma. Minim Invasive Ther Allied Technol. 2021 Aug;30(4):221-228.
2. Miayayama, et al. Outcomes of conventional transarterial chemoembolization for hepatocellular carcinoma ≥10 cm. Hepatology Research 2019; 49: 787–798
3. Mukund A, et al. Survival and Outcome in Patients Receiving Drug-Eluting Beads Transarterial Chemoembolization for Large Hepatocellular Carcinoma (>5 cm) J Clin Exp Hepatol. 2021;11:674-681.
4. Chen, et al. Comparison of the efficacy and safety of conventional transarterial chemoembolization with and without drug eluting beads embolization for the treatment of unresectable large hepatocellular carcinoma. Hepatology Research. 2021;51:482–489.
5. Huang et al. Drug-Eluting Bead Transarterial Chemoembolization Combined with FOLFOX-Based Hepatic Arterial Infusion Chemotherapy for Large or Huge Hepatocellular Carcinoma. Journal of Hepatocellular Carcinoma 2021:8: 1445-1458

Session 8-4

Radioembolization of solitary large HCC

Rheun-Chuan Lee

Taipei Veterans General Hospital, Taiwan

CURRENT POSITIONS
Chief, division of Abdominal Radiology, Department of Radiology, Taipei Veterans General Hospital

DUCATIONAL AND CAREER EXPERIENCES
He has developed his professional training experience with the Taipei Veterans General Hospital in the department of Radiology and Gastrointestinal Radiology. Overseas experience includes being a Research Fellow in MRI center in the Hospital of the University of Pennsylvania, USA, Living Donor Liver Transplant Imaging and Intervention training with the National Kyoto University Hospital, Kyoto, Japan, Yttrium-90 microspheres therapy training at St. Vincent Hospital Sydney in Australia and William Beaumont Hospital in USA. His research and personal interests include Liver-directed therapy, including TACE, Drug-eluting microspheres, Yttrium-90 microspheres therapy and contrast media.

RECENT PUBLICATIONS related to Y-90 SIRT

1. Prediction of survival according to kinetic changes of cytokines and hepatitis status following radioembolization with yttrium-90 microspheres. J Formos Med Assoc. 2020 Sep 22;S0929-6646(20)30428-9. Online ahead of print.
2. Simultaneous Time-of-Flight PET/MR Identifies the Hepatic 90Y-Resin Distribution After Radioembolization. Clin Nucl Med. 2020 Feb;45(2):e92-e93.
3. Nuclear Theranostics in Taiwan. Nucl Med Mol Imaging. 2019 Apr;53(2):86-91.
4. SIRveNIB: Selective Internal Radiation Therapy Versus Sorafenib in Asia-Pacific Patients With Hepatocellular Carcinoma. J Clin Oncol. 2018 Jul 1;36(19):1913-1921.
5. Management consensus guideline for hepatocellular carcinoma: 2016 updated by the Taiwan Liver Cancer Association and the Gastroenterological Society of Taiwan. J Formos Med Assoc. 2018 May;117(5):381-403.
6. Combined Yttrium-90 microsphere selective internal radiation therapy and external beam radiotherapy in patients with hepatocellular carcinoma: From clinical aspects to dosimetry. PLoS One. 2018 Jan 2;13(1):e0190098.
7. Three-dimensional Quantitative Color-coding Analysis on Hepatic Arterial Flow Change during Chemoembolization of Hepatocellular Carcinoma. J Vasc Interv Radiol. 2018; 29:1362–1368.
8. The Post-SIR-Spheres Surgery Study (P4S): Retrospective Analysis of Safety Following Hepatic Resection or Transplantation in Patients Previously Treated with Selective Internal Radiation Therapy with Yttrium-90 Resin Microspheres. Ann Surg Oncol. 2017 Sep;24(9):2465-2473.
9. A New Treatment-integrated Prognostic Nomogram of the Barcelona Clinic Liver Cancer System for Hepatocellular Carcinoma. Sci Rep. 2017 Aug 11;7(1):7914.
10. Prognostic role of noninvasive liver reserve markers in patients with hepatocellular carcinoma undergoing transarterial chemoembolization. PLoS One. 2017 Jul 3;12(7):e0180408.
11. Nomogram of the Barcelona Clinic Liver Cancer system for individual prognostic prediction in hepatocellular carcinoma. Liver Int. 2016 Oct;36(10):1498-506.
12. Consensus for Radiotherapy in Hepatocellular Carcinoma from The 5th Asia-Pacific Primary Liver Cancer Expert Meeting (APPLE 2014): Current Practice and Future Clinical Trials. Liver Cancer. 2016 Jul;5(3):162-74.
13. Current role of selective internal radiation with yttrium-90 in liver tumors. Future Oncol. 2016 May;12(9):1193-204.
14. Measurement of Arterial Flow Before and After Transcatheter Arterial Chemoembolization: A Feasibility Study Using Objective Quantitative Color-Coding Analysis. Cardiovasc Intervent Radiol. 2015 Dec;38(6):1494-501.
15. Patient selection and activity planning guide for selective internal radiotherapy with yttrium-90 resin microspheres. Int J Radiat Oncol Biol Phys. 2012 Jan 1;82(1):401-7.
16. Model-based radiation dose correction for yttrium-90 microsphere treatment of liver tumors with central necrosis. Int J Radiat Oncol Biol Phys. 2011 Nov 1;81(3):660-8.

Session 8-5

Radiotherapy of solitary large HCC

Jeong Il Yu

Department of Radiation Oncology, Samsung Medical Center,
Sungkyunkwan University School of Medicine, Seoul, Korea

Introduction
Despite proven radiotherapy (RT) role in diverse oncologic fields as one of the essential loco-regional modalities, the efficiency of RT for hepatocellular carcinoma (HCC) had been viewed negatively due to concerns about the deterioration of liver function related with the vulnerability of the normal liver to RT. Recently, however, with advancement of RT techniques, including highly precision RT devices, image guidance and effective breathing control, evidences that RT can be used effectively to overcome the several unmet needs of existing treatments and improve treatment outcomes in HCC management. In this presentation, I would like to discuss the merits of the application of RT in a solitary large HCC that is difficult to apply to the existing curative treatment or whose treatment results are not satisfactory.

Recent RT techniques in HCC

1. Three-dimensional conformal RT (3D-CRT) in HCC
The application of computed tomography (CT) images to RT planning has resulted in many developments in terms of not only calculating the radiation dose distribution in voxel units of tumor and normal organ volumes, but also determining and combining many and various beam directions (1). This 3D-CRT makes it possible to obtain dose-volume histograms (DVH) of tumors and normal organs and to predict the possibility of tumor control (tumor control probability, TCP) and side effects in normal organs (normal tissue complication probability, NTCP). Reflecting this, the radiation dose was increased while minimizing concerns about side effects. In particular, studies about the RT dose and treatment response, and tolerance dose of normal liver and the risk of radiation induced liver disease (RILD) were conducted based on 3D-CRT, confirming the safe application of RT in HCC, thereby laying the foundation for subsequent studies of RT application in HCC management.

2. Intensity modulated RT (IMRT) in HCC
IMRT is a type of CT planning-based RT like 3D-CRT, is a treatment method that delivers precise radiation to the tumor while minimizing radiation exposure to surrounding normal organs (2). Whereas the 3D-CRT is to find the best dose distribution through trial and error by the treatment planner, IMRT is created the best dose distribution through computer-based inverse treatment planning that minimizes the radiation dose to surrounding normal organs while delivering the radiation dose required for the tumor in voxel units like a mosaic through a multi-leaf collimator. The superiority of IMRT over 3D-CRT in HCC has not yet been clearly confirmed, but it has been suggested through dosimetric studies that IMRT can be superior at least when it is adjacent to important organs such as the gastrointestinal tract (2).

3. Stereotactic Body Ablative RT (SABR or SBRT) in HCC

Stereotactic body ablative RT (SABR) also known as SBRT is rather method using limited fraction number of 1 to 5 with relatively higher single dose of 10 gray (Gy) or more than specific RT technique (3). SABR is increasingly used as a valid alternative local ablative method in unresectable small primary and/or metastatic tumor in brain, lung, liver and/or other body part. Despite the biological advantages of conventionally fractionated RT, the application of SABR is increasing due to the improvement of high precision and accuracy, and long-term side effects are not expected to increase or rather decrease.

4. Particle beam RT in HCC

Recently, interest in particle beam RT including proton and heavy particles is growing, including gastrointestinal tumors, especially HCC (4). Actually, the physical advantage of particle beam RT including proton and carbon ion has been firstly suggested in 1940. The construction and use of proton and carbon ion beam therapy centers are increasing worldwide. Proton beam RT uses hydrogen nucleus and its unique characteristic called 'bragg peak', which emits most of the radiation dose at a specific point determined according to the specific energy. It is a treatment method that delivers radiation dose intensively to the target tumor site and minimizes radiation exposure to surrounding organs.

RT outcomes for solitary large HCC

When the size of the HCC is relatively large compared to surrounding normal liver, it is difficult to avoid the increase in radiation exposure to the normal liver even when high-precision, image guided RT is performed. Therefore, for the effective local control of large HCC while protecting surrounding normal liver, several strategies are being approached in terms of RT, like combination treatment with transarterial chemoembolization (TACE) followed by RT and concurrent chemo-RT, and/or surgery, and particle beam RT.

1. TACE-RT in solitary large HCC

The efficacy of combination of TACE and RT compared with TACE alone for HCC in terms of treatment response and overall survival was repeatedly confirmed by several randomized and non-randomized trials including meta-analysis. According to the mata-analysis by Huo et al., survival benefit of RT combination progressively increased from one (odds ratio [OR] 1.36, [95% confidence interval (1) 1.19-1.54) to five year (OR 3.98, 95% CI 1.86-8.51) than TACE alone (5). The efficacy of this combination treatment for HCC with macroscopic tumor thrombosis also confirmed by randomized trial superiority to sorafenib (6). Recent study evaluating the efficacy of TACE and SBRT for single HCC from 4 to 7 cm not suitable for resection or liver transplantation, overall treatment response was 91% with median progression-free survival (PFS) of 35 months (7).

2. Particle beam RT in solitary large HCC

Based on its physical properties, particle beam can reduce the amount of radiation exposed to surrounding organs, including normal liver which can maximize its benefits, especially in relatively large HCC. It suggests the possibility that particle beam RT could be very useful in terms of local control for solitary large HCC. There is a drastic difference of the risk of RILD between proton beam and IMRT if the diameter of HCC is more than 6.3 cm in one dosimetric study (8). In a retrospective study proton beam RT for 22 patients with HCC of size more than 10 cm (range, 10 to 14 cm), the 2-year local control and OS were 87% and 36%, respectively (9).

The usefulness of proton beam RT in HCC, particularly in terms of local control, is also confirmed in a randomized phase III trial showed non-inferiority compared to radiofrequency ablation, one of the standard treatments, although the subjects were patients with recurrent small HCC (10). Also in the preliminary analysis of a randomized trial of TACE versus PBT for HCC met the Milan or San Francisco transplant criteria, showed a trend toward improved 2-year local control (88% vs 45%) and PFS (48% vs 31%) favoring PBT, although the difference between the two methods was not statistically significant (11).

Although the clinical reports are still very limited, carbon ion beam also shows promising results based on similar or potentially superior physical properties to proton beam. According to the results of a recently published prospective clinical study of carbon ion RT for HCC, the 2-year local control and OS were 92.6% and 76.7%, respectively (12).

Conclusions

With recent technical development of RT, RT could effectively compensate unmet need of HCC as one of the most effective loco-regional modalities in oncologic fields, and lead improvement of treatment outcomes both now and in the future.

References

1. Park HC, Seong J, Han KH, Chon CY, Moon YM, Suh CO. Dose-response relationship in local radiotherapy for hepatocellular carcinoma. Int J Radiat Oncol Biol Phys 2002; 54: 150-155.
2. Bae SH, Jang WI, Park HC. Intensity-modulated radiotherapy for hepatocellular carcinoma: dosimetric and clinical results. Oncotarget 2017; 8: 59965-59976.
3. Dawson LA, Eccles C, Craig T. Individualized image guided iso-NTCP based liver cancer SBRT. Acta Oncol 2006; 45: 856-864.
4. Skinner HD, Hong TS, Krishnan S. Charged-particle therapy for hepatocellular carcinoma. Semin Radiat Oncol 2011; 21: 278-286.
5. Huo YR, Eslick GD. Transcatheter Arterial Chemoembolization Plus Radiotherapy Compared With Chemoembolization Alone for Hepatocellular Carcinoma: A Systematic Review and Meta-analysis. JAMA Oncol 2015; 1: 756-765.
6. Yoon SM, Ryoo BY, Lee SJ, Kim JH, Shin JH, An JH, et al. Efficacy and Safety of Transarterial Chemoembolization Plus External Beam Radiotherapy vs Sorafenib in Hepatocellular Carcinoma With Macroscopic Vascular Invasion: A Randomized Clinical Trial. JAMA Oncol 2018; 4: 661-669.
7. Buckstein M, Kim E, Özbek U, Tabrizian P, Gunasekaran G, Facciuto M, et al. Combination Transarterial Chemoembolization and Stereotactic Body Radiation Therapy for Unresectable Single Large Hepatocellular Carcinoma: Results From a Prospective Phase 2 Trial. Int J Radiat Oncol Biol Phys 2022.
8. Toramatsu C, Katoh N, Shimizu S, Nihongi H, Matsuura T, Takao S, et al. What is the appropriate size criterion for proton radiotherapy for hepatocellular carcinoma? A dosimetric comparison of spot-scanning proton therapy versus intensity-modulated radiation therapy. Radiat Oncol 2013; 8: 48.
9. Sugahara S, Oshiro Y, Nakayama H, Fukuda K, Mizumoto M, Abei M, et al. Proton beam therapy for large hepatocellular carcinoma. Int J Radiat Oncol Biol Phys 2010; 76: 460-466.
10. Kim TH, Koh YH, Kim BH, Kim MJ, Lee JH, Park B, et al. Proton beam radiotherapy vs. radiofrequency ablation for recurrent hepatocellular carcinoma: A randomized phase III trial. J Hepatol 2021; 74: 603-612.
11. Bush DA, Smith JC, Slater JD, Volk ML, Reeves ME, Cheng J, et al. Randomized Clinical Trial Comparing Proton Beam Radiation Therapy with Transarterial Chemoembolization for Hepatocellular Carcinoma: Results of an Interim Analysis. Int J Radiat Oncol Biol Phys 2016; 95: 477-482.
12. Shibuya K, Katoh H, Koyama Y, Shiba S, Okamoto M, Okazaki S, et al. Efficacy and Safety of 4 Fractions of Carbon-Ion Radiation Therapy for Hepatocellular Carcinoma: A Prospective Study. Liver Cancer 2022; 11: 61-74.

Session 9-1

Interventional treatment of GI bleeding

Charles Y. Kim

Division of Interventional Radiology, Duke University, USA

Introduction

Angiography and embolization continue to play a crucial role in the management of both upper and lower GI bleeding. While sources of upper GI bleeding are often easily identified with endoscopy, the small intestine remains a challenging area for localization. In some cases, the lower GI tract can prove challenging as well. The advent of CT angiography has made tremendous impact on the ability to localize bleeding, both arterial and portal, which is particularly important when endoscopy does not reveal the source. Intermittent GI bleeding can also prove to be a particular challenge.

CT angiography

CT angiography has emerged as a first-line diagnostic imaging method for localization of GI bleeding in the lower GI tract. While endoscopy remains first-line for the upper GI tract, CT angiography can be helpful for problem-solving as well. Not only can CTA indicate whether active bleeding is occurring or not, it can reveal the actual underlying etiology in some cases. Furthermore, the utility of CTA has shown to compare favorably to capsule endoscopy in the small bowel. Lastly, CTA can be extremely helpful in planning actual interventions.

Ectopic varices

Ectopic varices, which are portosystemic shunts that course submucosally in the small or large bowel, are often difficult to diagnose, especially when not accessible by endoscopy. CTA can be a crucial tool for their diagnosis. These varices, caused by portomesenteric hypertension are rare and can be extremely difficult to manage. Once identified, IR methods for treatment entail embolization, anterograde or retrograde, using a variety of approaches and techniques.

Provocative mesenteric angiography

Provocative mesenteric angiography is a procedure for patients with intermittent massive GI bleeding, wherein pharmacologic agents are administered in order to provoke active bleeding during the performance of angiography, so that the source can be identified and embolized for definitive treatment. Typical agents include an intra-arterial vasodilator to resolve any existing vasospasm that is often associated during bleeding cessation, a thrombolytic agent such as tPA to dissolve the thrombus that has formed at the site of arterial injury, and systemic heparinization to ensure that once hemorrhage continues until it can be embolized. The success rate of this procedure is moderate but with an excellent safety profile for this challenging population with obscure GI bleeding.

Conclusions

Patients with obscure GI bleeding often pose a diagnostic and therapeutic dilemma. A strong multidisciplinary collaboration, optimal diagnostic imaging, and broad consideration of etiologies and strategies are crucial for successful management.

Session 9-2

Role of capsule endoscopy in obscure gastrointestinal bleeding

Sang Hoon Kim

Department of Gastroenterology and Hepatology, Dongguk University Hospital, Ilsan, Korea

Introduction

The small bowel has been difficult to examine by traditional endoscopic and radiologic techniques. Wireless capsule endoscopy (CE) is widely used for small bowel imaging since its introduction in 2000. It is a non-invasive, patient-friendly method offering complete videos facilitating detection and monitoring lesions within the entire small bowel. According to the European Society of Gastrointestinal Endoscopy (ESGE) recommendations, CE is the first-line evaluation method in patients with obscure gastrointestinal (GI) bleeding. CE is preferred over other small bowel endoscopies, such as double-balloon enteroscopy (DBE), and it also shows a significantly higher diagnostic yield than other radiological methods. Thus, CE is widely recommended as the first-line diagnostic modality for OGIB. In this session, we will talk about the optimal use of capsule endoscopy in OGIB and the future evolution of CE.

Role of CE in OGIB

1. Diagnostic performance in OGIB

The diagnostic yield of CE in OGIB has been reported differently depending on the definition of positive findings and the type of bleeding investigated. Early investigations revealed sensitivity and negative predictive value of CE is 88.9-95.0% and 82.6-100.0%, respectively. In a systemic review by Liao et al., the pooled detection rate for OGIB was 60.5%. CE identifies significantly more SB bleeding sources than push enteroscopy ($P<0.05$).

2. When to repeat upper and lower endoscopy before CE

Unfortunately, up to 25% lesions are missed during the evaluation for suspected small bowel bleeding on initial upper endoscopy or colonoscopy. Therefore, a careful selection of patients for repeating upper and lower endoscopy is important. As such, based on the patient's clinical presentation, we recommend repeating an upper endoscopy with or without a colonoscopy if bleeding limited the view in the previous study. In hemodynamically stable patients with isolated iron deficiency anemia, other etiologies such as celiac disease as well as hematologic and gynecologic pathologies should be also ruled out. If high-quality upper and lower endoscopic exams have recently been completed, a second-look endoscopy is likely not cost-effective and may be avoided. The terminal ileum must be evaluated for blood, ileitis and SB tumors when repeating a lower gastrointestinal evaluation.

3. Factors associated with positive CE results

A careful patient selection is important not only because it can cause discomfort to the patient, but it is cost expensive. Factors associated with positive CE results include ongoing overt bleeding, CE being performed within 1 or 2 weeks from the previous bleeding episode, severe anemia, and increased transfusion requirements, increasing age, anti-coagulation therapy, and liver comorbidities.

4. Impact of CE on the prognosis of OGIB

Several studies have reported a favorable clinical impact of CE on patients with OGIB. CE changes the clinical management in 61.4%

of patients with OGIB and reduces hospitalization, additional tests/procedures, and units of blood transfused. However, the long-term prognosis seems to depend on rebleeding after OGIB control rather than solely performing CE. Several Korean studies showed no significant differences in rebleeding rates according to CE results. Angiodysplasia seems to be a major contributor associated with a high risk of rebleeding.

5. Risk of capsule retention

One of the adverse outcomes of CE is capsule retention. Even if an OGIB patient presents without obstructive symptoms, a capsule can possibly lodge above various strictures, including with suspected or documented Crohn's disease, past medical history of abdominal surgery or radiation therapy, patients on NSAIDs or potassium over a long period. Unfortunately, Small bowel series and CT enteroscopy before SBCE are not highly effective for predicting endoluminal narrowing. In this case, tag-less patency capsule should be carried out before SBCE. However, the patency capsule is not entirely safe as it may induce small bowel obstruction. Therefore, patients for CE should be carefully selected. taking an adequate medical history (e.g. previous abdominal surgery, prescribed medications taken, obstructive symptoms) is crucial to avoid capsule retention.

6. Role of artificial intelligence assisted CE

A deep learning artificial intelligence (AI) model to identify and categorize all small-bowel ulcers, bleeding using over 100 million VCE images has achieved an impressive 99.90% overall sensitivity and 99.88% specificity, whereas gastroenterologists identified lesions with a 74.57% sensitivity in the per-patient analysis and 76.89% sensitivity in the per-lesion analysis. AI is expanding its application not only in the field of gastrointestinal bleeding but also in each diagnostic field of capsule endoscopy. Although some technical barriers are to be overcome, it is expected to be clinically ready-to-use within a few years.

Conclusions

OGIB should be diagnosed efficiently and promptly using CT, SBCE, and device-assisted enteroscopy with possible bleeding causes derived from elaborate history interview and physical examination.

References

1. Aktas, H. & Mensink, P. B. Small bowel diagnostics: current place of small bowel endoscopy. Best Pract Res Clin Gastroenterol 26, 209-220, doi:10.1016/j.bpg.2012.03.007 (2012).
2. González-Suárez, B., Galter, S. & Balanzó, J. [Wireless capsule endoscopy: basic principles and clinical utility]. Cir Esp 81, 299-306, doi:10.1016/s0009-739x(07)71328-3 (2007).
3. Pennazio, M. et al. Small-bowel capsule endoscopy and device-assisted enteroscopy for diagnosis and treatment of small-bowel disorders: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. Endoscopy 47, 352-376, doi:10.1055/s-0034-1391855 (2015).
4. Tang, S. J. & Haber, G. B. Capsule endoscopy in obscure gastrointestinal bleeding. Gastrointest Endosc Clin N Am 14, 87-100, doi:10.1016/j.giec.2003.10.011 (2004).
5. Iwamoto, J. et al. The clinical outcome of capsule endoscopy in patients with obscure gastrointestinal bleeding. Hepatogastroenterology 58, 301-305 (2011).
6. Pennazio, M. et al. Outcome of patients with obscure gastrointestinal bleeding after capsule endoscopy: report of 100 consecutive cases. Gastroenterology 126, 643-653, doi:10.1053/j.gastro.2003.11.057 (2004).
7. Hartmann, D. et al. A prospective two-center study comparing wireless capsule endoscopy with intraoperative enteroscopy in patients with obscure GI bleeding. Gastrointest Endosc 61, 826-832, doi:10.1016/s0016-5107(05)00372-x (2005).
8. Pennazio, M., Eisen, G. & Goldfarb, N. ICCE consensus for obscure gastrointestinal bleeding. Endoscopy 37, 1046-1050, doi:10.1055/s-2005-870319 (2005).
9. Liao, Z., Gao, R., Xu, C. & Li, Z. S. Indications and detection, completion, and retention rates of small-bowel capsule endoscopy: a systematic review. Gastrointest Endosc 71, 280-286, doi:10.1016/j.gie.2009.09.031 (2010).
10. Mylonaki, M., Fritscher-Ravens, A. & Swain, P. Wireless capsule endoscopy: a comparison with push enteroscopy in patients with gastroscopy and colonoscopy negative gastrointestinal bleeding. Gut 52, 1122-1126, doi:10.1136/gut.52.8.1122 (2003).
11. Fry, L. C., Bellutti, M., Neumann, H., Malfertheiner, P. & Mönkemüller, K. Incidence of bleeding lesions within reach of conventional upper and lower endoscopes in patients undergoing double-balloon enteroscopy for obscure gastrointestinal bleeding. Aliment Pharmacol Ther 29, 342-349, doi:10.1111/j.1365-2036.2008.03888.x (2009).
12. Tee, H. P. & Kaffes, A. J. Non-small-bowel lesions encountered during double-balloon enteroscopy performed for obscure gastrointestinal bleeding. World J Gastroenterol 16, 1885-1889, doi:10.3748/wjg.v16.i15.1885 (2010).
13. Vlachogiannakos, J. et al. Bleeding lesions within reach of conventional endoscopy in capsule endoscopy examinations for obscure gastrointestinal bleeding: is repeating endoscopy economically feasible? Dig Dis Sci 56, 1763-1768, doi:10.1007/s10620-011-1592-3 (2011).
14. Gilbert, D., O'Malley, S. & Selby, W. Are repeat upper gastrointestinal endoscopy and colonoscopy necessary within six months of capsule endoscopy in patients with obscure gastrointestinal bleeding? J Gastroenterol Hepatol 23, 1806-1809, doi:10.1111/j.1440-1746.2008.05643.x (2008).
15. Ge, Z. Z., Chen, H. Y., Gao, Y. J., Hu, Y. B. & Xiao, S. D. Best candidates for capsule endoscopy for obscure gastrointestinal bleeding. J Gastroenterol Hepatol 22, 2076-2080, doi:10.1111/j.1440-1746.2006.04724.x (2007).
16. Bresci, G., Parisi, G., Bertoni, M., Tumino, E. & Capria, A. The role of video capsule endoscopy for evaluating obscure gastrointestinal bleeding: usefulness of early use. J Gastroenterol 40, 256-259, doi:10.1007/s00535-004-1532-5 (2005).
17. Esaki, M. et al. Factors associated with the clinical impact of capsule endoscopy in patients with overt obscure gastrointestinal bleeding. Dig Dis Sci 55, 2294-2301, doi:10.1007/s10620-009-1036-5 (2010).
18. May, A., Wardak, A., Nachbar, L., Remke, S. & Ell, C. Influence of patient selection on the outcome of capsule endoscopy in patients with chronic gastrointestinal bleeding. J Clin Gastroenterol 39, 684-688, doi:10.1097/01.mcg.0000173857.22933.3b (2005).
19. Estévez, E. et al. Diagnostic yield and clinical outcomes after capsule endoscopy in 100 consecutive patients with obscure gastrointestinal bleeding. Eur J Gastroenterol Hepatol 18, 881-888, doi:10.1097/00042737-200608000-00014 (2006).
20. Parikh, D. A., Mittal, M., Leung, F. W. & Mann, S. K. Improved diagnostic yield with severity of bleeding. J Dig Dis 12, 357-363, doi:10.1111/j.1751-2980.2011.00520.x (2011).
21. Redondo-Cerezo, E. et al. Diagnostic yield and impact of capsule endoscopy on management of patients with gastrointestinal bleeding of obscure origin. Dig Dis Sci 52, 1376-1381, doi:10.1007/s10620-006-9605-3 (2007).
22. Carey, E. J. et al. A single-center experience of 260 consecutive patients undergoing capsule endoscopy for obscure gastrointestinal bleeding. Am J Gastroenterol 102, 89-95, doi:10.1111/j.1572-0241.2006.00941.x (2007).
23. Min, Y. W. et al. Long-term outcome of capsule endoscopy in obscure gastrointestinal bleeding: a nationwide analysis. Endoscopy 46, 59-65, doi:10.1055/s-0033-1358803 (2014).
24. Park, J. J. et al. Negative capsule endoscopy without subsequent enteroscopy does not predict lower long-term rebleeding rates in patients with obscure GI bleeding. Gastrointest Endosc 71, 990-997, doi:10.1016/j.gie.2009.12.009 (2010).
25. Koh, S. J. et al. Long-term outcome in patients with obscure gastrointestinal bleeding after negative capsule endoscopy. World J Gastroenterol 19, 1632-1638, doi:10.3748/wjg.v19.i10.1632 (2013).
26. Saurin, J. C. et al. Clinical impact of capsule endoscopy compared to push enteroscopy: 1-year follow-up study. Endoscopy 37, 318-323, doi:10.1055/s-2005-861114 (2005).
27. Magalhães-Costa, P. et al. Re-bleeding events in patients with obscure gastrointestinal bleeding after negative capsule endoscopy. World J Gastrointest Endosc 7, 403-410, doi:10.4253/wjge.v7.i4.403 (2015).
28. Concha, R., Amaro, R. & Barkin, J. S. Obscure gastrointestinal bleeding: diagnostic and therapeutic approach. J Clin Gastroenterol 41, 242-251, doi:10.1097/01.mcg.0000225616.79223.75 (2007).
29. Herrerias, J. M. et al. Agile patency system eliminates risk of capsule retention in patients with known intestinal strictures who undergo capsule endoscopy. Gastrointest Endosc 67, 902-909, doi:10.1016/j.gie.2007.10.063 (2008).
30. Ding, Z. et al. Gastroenterologist-Level Identification of Small-Bowel Diseases and Normal Variants by Capsule Endoscopy Using a Deep-Learning Model. Gastroenterology 157, 1044-1054.e1045, doi:10.1053/j.gastro.2019.06.025 (2019).

Session 9-3

Challenging raidologic treatment cases

Joon Ho Kwon

Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Case 1

M/25
P.Hx: Crohn's disease
C.C: recurrent hematochezia

Abdomen CT scan: Suspicious of active bleeding focus at pelvic small bowel loop

Case 2

M/63
P.Hx: s/p liver transplantation
C.C: recurrent pancreatitis

Abdomen CT scan: pseudoaneurysm at pancreas body portion

Case 3

M/49
P.Hx: Ulcerative colitis, s/p total proctocolectomy, s/o gsatrojejunostomy
C.C: recurrent hematochezia, melena

Abdomen CT scan: no evidence of active bleeding
Angiography: no active bleeding focus

Session 9-4

Challenging surgical treatment cases

Seung-Bum Ryoo

Seoul National University, Korea

Occupation

Clinical Associate Professor
Division of Colorectal Surgery, Department of Surgery
Seoul National University Hospital
Seoul National University College of Medicine

Education

1994 ~ 2001, Seoul National University College of Medicine, MD.
2005 ~ 2011, Seoul National University College of Medicine, MS.
2011 ~ 2017, Seoul National University College of Medicine, PhD.

Experiences

2001 ~ 2002, Internship, Seoul National University Hospital
2002 ~ 2006, Residency, Department of Surgery, Seoul National University Hospital
2006 ~ 2009, Public Health Doctor as Mandatory Military Service, Korea
2009 ~ 2010, Fellowship, Division of Colorectal Surgery, Department of Surgery, Seoul National University Hospital
2010 ~ 2012, Staff, Division of Colorectal Surgery, Department of Surgery, Dongnam Inst. of Radiology & Medical Science
2012 ~ 2014, Clinical Instructor, Division of Colorectal Surgery, Department of Surgery, Seoul National University Hospital
2014 ~ 2018, Clinical Assistant Professor, Division of Colorectal Surgery, Department of Surgery, Seoul National University Hospital
2017 ~ 2019, Visiting Scholar, Department of Physiology & Cell Biology, School of Medicine, University of Nevada Reno
2018 ~ , Clinical Associate Professor, Division of Colorectal Surgery, Department of Surgery, Seoul National University Hospital

Session 10-1

Treatment of HCC with bile duct invasion: Hepatologist's perspective

Jonggi Choi

Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Introduction

Jaundice in most hepatocellular carcinoma (HCC) patients is caused by parenchymal insufficiency associated with underlying liver cirrhosis or parenchymal tumor infiltration. However, jaundice can also occur secondary to obstruction of biliary tract, which has been reported in 2-9% of HCC patients, because of tumor invasion of the bile duct, or obstruction by tumor thrombi, tumor fragments, or blood clots.

Main body

Surgical palliation is rarely used to treat obstructive jaundice in patients with HCC. Because, patients with HCC may have poor hepatic functional reserve. Therefore, attention has focused on non-surgical methods of palliation, including percutaneous transhepatic biliary drainage (PTBD) and endoscopic biliary drainage (EBD). PTBD has been associated with a relatively high rate of complications, as well as with patient discomfort because of a need for external drainage. In contrast, EBD is more acceptable to patients with HCC, considering hepatic function, bleeding tendency and quality of life. However, these two methods may work complementary depending on the patients' tumor characteristics and liver function.

Conclusions

Importance of early recognition of cholestasis symptoms and application of appropriate biliary drainage may preserve liver function, allowing continuation of anti-cancer treatment for HCC.

Session 10-2

Endoscopic management of obstructive jaundice due to HCC with bile duct invasion

Kwang Hyun Chung

Department of Internal Medicine, Uijeongbu Eulji Medical Center, Eulji University, School of Medicine, Korea

Introduction

Primary liver cancer, which accounts for most of hepatocellular carcinoma (HCC) is the the sixth most diagnosed cancer and the fourth leading cause of cancer death worldwide[1]. Traditionally, it mostly occurred in East Asia including Korea and sub-Saharan Africa, but recently, it is also increasing in North America and several Europe regions[2].

Jaundice is a common symptom of HCC which occurs in about 5% to 44% of HCC patients at initial diagnosis and it occurs more in the later stages of the disease[3-8]. This occurs mostly in relation to liver parenchymal insufficiency due to liver cirrhosis or destruction of the liver parenchyma by the tumor[9]. On the other hand, obstructive jaundice is less common and has reported that it accounts for about 0.5% to 13% of HCC patients[10-12]. However, obstructive jaundice still has great clinical significance in HCC patients because it can be improved through appropriate biliary drainage[10, 13].

Characteristics of bile duct obstruction due to hepatocellular carcinoma

Classification of Biliary Obstruction

Biliary duct obstruction caused by hepatocellular carcinoma can be divided into extrahepatic and intrahepatic depending on the location of the obstruction and it can be classified into type 1, intraluminal obstructions; type 2, hemobilia; and type 3, extraluminal obstruction by the mechanism of obstruction according to cholangiographic feature. In one study, patients with the extrahepatic type showed a higher curative resection rate and a higher survival rate than those with the intrahepatic type[14]. Lai EC et. al reported a classification system that combined the above two classification criteria and reported that extraluminal obstruction had a worse prognosis than the other two types[12].

Impact of obstructive jaundice on HCC patients and role of drainage

Although there is not much evidence, obstructive jaundice in HCC patients is associated with a poor prognosis, which is due to more portal vein thrombi, unresectability and worse liver function. There have been several retrospective studies showing that biliary drainage improves the prognosis of HCC patients, and the results are relatively consistent. In one retrospective study, obstructive jaundice was observed in 88 of 247 patients with HCC with bile duct invasion, which was associated with a shorter overall survival[15]. In the same study, biliary drainage was performed in 54.5% of patients and successful biliary drainage was associated with better overall survival. There is no prospective study on whether biliary drainage really improves the prognosis of HCC patients, and it is thought that such studies will probably not be possible in the future due to ethical issues.

In addition to improving the survival rate, biliary drainage has theoretical advantages that can improve the quality of life and improve liver function. Also, with successful biliary drainage, it can provide an opportunity for additional anti-cancer treatment. Choi et al. showed that the survival rate of HCC patients was improved after successful biliary drainage compared to who failed the biliary drainage. And the survival rate was further improved when transarterial chemoembolization of tumor was performed after successful drainage[16]. Therefore, biliary drainage should always be considered as a treatment option when jaundice occurs in HCC patients.

Endoscopic Management of Obstructive Jaundice in HCC patients

Biliary drainage can be largely divided into percutaneous and endoscopic approach. The choice of which drainage method to use depends on the patient's general medical condition, and location and mechanisms of biliary obstruction. The advantages of endoscopic retrograde biliary drainage (ERBD) over percutaneous transhepatic biliary drainage (PTBD) are that it is less invasive and more physiological because bile is drained internally, and the patient feels less discomfort due to the absence of an extracorporeal tube[17]. The disadvantage is that the procedure is more complicated using endoscope, and complications such as intestinal perforation and post-ERCP pancreatitis may occur. It also lacks an external tube, making flushing of catheter is not possible and requires frequent stent replacement.

Efficacy of Endoscopic Retrograde Biliary Drainage in HCC patients

Studies have shown that ERBD has a technical success rate of 95% to 100%, and a clinical success rate of 40% to 80%[13, 16, 18, 19]. Complication rate was about 20-30%[13, 18], which seems higher than those of studies with periampullary cancer or cholangiocarcinoma patients (4.2 – 7%)[20-22]. This high complication rate is probably due to the hypervascular nature of HCC and frequently accompanied liver cirrhosis and hepatic insufficiency. According to the most recent study, ERBD was performed on 107 HCC patients with biliary obstruction. The technical success rate was 98.1% and the clinical success rate was 81%. The successful biliary drainage was associated with a good prognosis for patients[23].

Selection of Stent Type

Currently, the types of stents used for biliary drainage can be broadly divided into plastic stents and self-expandible metallic stents. Since self-expandible metallic stents has a larger inner diameter than a plastic stent, it is expected to have longer patency than that of a plastic stent. Metal stents are more expensive than plastic stents but are more cost-effective than plastic stents if the patient is expected to survive for more than 6 months.

Disadvantage of metallic stent is that is may not suitable for peripheral small duct due to its large diameter amd tumor or ductal mucosal tissue can grow into the stent mesh which can block the stent. Covered metal stent can prevent this with membrane but, it is prone to stent migration. However, the advantages of metal stents just discussed may not be applicable in HCC. Because most biliary obstruction in hepatocellular carcinoma occur at the hilar or intrahepatic level, tumor thrombus or hemobilia are more common, and the background liver condition is worse with liver cirrhosis and coagulopathy. In this situation, the large diameter of the metal stent may not be an advantage. One retrospective study showed that there was no significant difference between the plastic stent and metallic stent in terms of successful drainage and stent patency, and the patient's overall survival was longer with the plastic stent. The characteristics of lesion, and life expectancy of patient should be considered in selection of stent

Endoscopic Ultrasound Guided Biliary Drainage

ERBD has a disadvantage in that it is difficult to perform in patients with anatomical alteration of the gastrointestinal tract, tumor preventing access into the biliary tree. Endoscopic ultrasound guided biliary drainage (EUS-BD) can be tried if percutaneous access also is difficult in these patients. According to existing studies, the technical success rate of EUS-BD is 90~94% and the incidence of complications is 16.5~23.3%[24-26]. However, there are no data from studies with HCC patients only.

Conclusions

Obstructive jaundice accounts for a small percentage of all jaundice in HCC patients but, it is very important to distinguish it from jaundice caused by liver failure. Endoscopic drainage, like other cancers, is still an effective drainage method in HCC patients. The drainage method should be decided in consideration of the patient's liver function or the location of the biliary obstruction.

References

1. Bray, F., et al., Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin, 2018. 68(6): p. 394-424.
2. Kulik, L. and H.B. El-Serag, Epidemiology and Management of Hepatocellular Carcinoma. Gastroenterology, 2019. 156(2): p. 477-491 e1.
3. Edmondson, H.A. and P.E. Steiner, Primary carcinoma of the liver: a study of 100 cases among 48,900 necropsies. Cancer, 1954. 7(3): p. 462-503.
4. Ihde, D.C., et al., Clinical manifestations of hepatoma. A review of 6 years' experience at a cancer hospital. Am J Med, 1974. 56(1): p. 83-91.
5. Kew, M.C. and E.W. Geddes, Hepatocellular carcinoma in rural southern African blacks. Medicine (Baltimore), 1982. 61(2): p. 98-108.
6. Shiu, W., et al., Hepatocellular carcinoma in Hong Kong: clinical study on 340 cases. Oncology, 1990. 47(3): p. 241-5.
7. Lau, W., et al., A logical approach to hepatocellular carcinoma presenting with jaundice. Ann Surg, 1997. 225(3): p. 281-5.
8. Lau, W.Y., et al., Cholangiographic features in the diagnosis and management of obstructive icteric type hepatocellular carcinoma. HPB Surg, 2000. 11(5): p. 299-306.
9. Lau, W.Y., J.W. Leung, and A.K. Li, Management of hepatocellular carcinoma presenting as obstructive jaundice. Am J Surg, 1990. 160(3): p. 280-2.
10. Qin, L.X. and Z.Y. Tang, Hepatocellular carcinoma with obstructive jaundice: diagnosis, treatment and prognosis. World J Gastroenterol, 2003. 9(3): p. 385-91.
11. Huang, J.F., et al., Incidence and clinical outcome of icteric type hepatocellular carcinoma. J Gastroenterol Hepatol, 2002. 17(2): p. 190-5.
12. Lai, E.C. and W.Y. Lau, Hepatocellular carcinoma presenting with obstructive jaundice. ANZ J Surg, 2006. 76(7): p. 631-6.
13. Cho, H.C., et al., Are endoscopic or percutaneous biliary drainage effective for obstructive jaundice caused by hepatocellular carcinoma? Eur J Gastroenterol Hepatol, 2011. 23(3): p. 224-31.
14. Lau, W.Y., et al., Obstructive jaundice secondary to hepatocellular carcinoma. Surg Oncol, 1995. 4(6): p. 303-8.
15. An, J., et al., Clinical features and outcomes of patients with hepatocellular carcinoma complicated with bile duct invasion. Clin Mol Hepatol, 2017. 23(2): p. 160-169.
16. Choi, J., et al., Palliative treatment of unresectable hepatocellular carcinoma with obstructive jaundice using biliary drainage with subsequent transarterial chemoembolization. J Palliat Med, 2013. 16(9): p. 1026-33.
17. Paik, W.H., et al., Palliative treatment with self-expandable metallic stents in patients with advanced type III or IV hilar cholangiocarcinoma: a percutaneous versus endoscopic approach. Gastrointest Endosc, 2009. 69(1): p. 55-62.
18. Choi, J., et al., Clinical usefulness of endoscopic palliation in patients with biliary obstruction caused by hepatocellular carcinoma. Digestion, 2013. 88(2): p. 87-94.
19. Sugiyama, G., et al., Evaluation of endoscopic biliary stenting for obstructive jaundice caused by hepatocellular carcinoma. World J Gastroenterol, 2014. 20(22): p. 6968-73.
20. Dumonceau, J.M., et al., European Society of Gastrointestinal Endoscopy (ESGE) Guideline Development Policy. Endoscopy, 2012. 44(6): p. 626-9.
21. Kaassis, M., et al., Plastic or metal stents for malignant stricture of the common bile duct? Results of a randomized prospective study. Gastrointest Endosc, 2003. 57(2): p. 178-82.
22. England, R.E., et al., A prospective randomised multicentre trial comparing 10 Fr Teflon Tannenbaum stents with 10 Fr polyethylene Cotton-Leung stents in patients with malignant common duct strictures. Gut, 2000. 46(3): p. 395-400.
23. Matsumi, A., et al., Effectiveness, safety, and factors associated with the clinical success of endoscopic biliary drainage for patients with hepatocellular carcinoma: a retrospective multicenter study. BMC Gastroenterol, 2021. 21(1): p. 28.
24. Kedia, P., M. Gaidhane, and M. Kahaleh, Endoscopic guided biliary drainage: how can we achieve efficient biliary drainage? Clin Endosc, 2013. 46(5): p. 543-51.
25. Park do, H., et al., EUS-guided biliary drainage with transluminal stenting after failed ERCP: predictors of adverse events and long-term results. Gastrointest Endosc, 2011. 74(6): p. 1276-84.
26. Park do, H., et al., Prospective evaluation of a treatment algorithm with enhanced guidewire manipulation protocol for EUS-guided biliary drainage after failed ERCP (with video). Gastrointest Endosc, 2013. 78(1): p. 91-101.

Session 10-3

Surgical management for HCC with bile duct invasion

Dai Hoon Han

Department of Surgery, Yonsei University College of Medicine, Seoul, Korea

Abstract

Bile duct tumor thrombus (BDTT) from hepatocellular carcinoma (HCC) is unusual with the incidence of approximately 1.2 to 9.0%. Presentation of BDTT is various from microscopic invasion to macroscopic invasion even to the first braches of the common hepatic duct with or without obstructive jaundice. Although the prognosis of the patients with HCC accompanying BDTT is relatively poor, curative aimed surgical resection may provide better prognosis for these patients. According to the recently published propensity-score matching analysis, surgical approaches to BDTT provided better survival outcomes comparing transcatheter arterial chemoembolization (TACE). Surgeons may choose various surgical options to the patients, such as anatomic resection versus non-anatomic liver resection, and liver resection combined bile duct resection versus liver resection with only bile duct thrombectomy. Wu, et al recently reported that anatomic liver resection is superior to non-anatomic liver resection especially for the patient with less than 5 cm tumors. According to the another propensity matching study by Feng, et al. recurrence free survival rates in the patients with extrahepatic bile duct resection was significantly higher compared to those with only thrombectomy. According to the Korea-Japan multicenter study about surgical outcomes of HCC with BDTT, both performing liver resection more than hemihepatectomy and combined with bile duct resection significantly increased overall survival and decreased recurrence rate. Therefore, an aggressive surgical approach including major liver resection combined with bile duct resection and bilioenteric anastomosis may improve survival outcomes. [1-13]

References

1. Wu JY, Sun JX, Wu JY, Huang XX, Bai YN, Wei YG, et al. Impact of Bile Duct Tumor Thrombus on the Long-Term Surgical Outcomes of Hepatocellular Carcinoma Patients: A Propensity Score Matching Analysis. Ann Surg Oncol. 2022;29:949-58.
2. Liu ZH, Sun JX, Feng JK, Yang SY, Chen ZH, Liu C, et al. Prognostic Comparison Between Liver Resection and Transcatheter Arterial Chemoembolization for Hepatocellular Carcinoma Patients With Bile Duct Tumor Thrombus: A Propensity-Score Matching Analysis. Front Oncol. 2022;12:835559.
3. Wu JY, Sun JX, Bai YN, Huang XX, Wu JY, Wei YG, et al. Long-Term Outcomes of Anatomic Versus Nonanatomic Resection in Hepatocellular Carcinoma Patients with Bile Duct Tumor Thrombus: A Propensity Score Matching Analysis. Ann Surg Oncol. 2021;28:7686-95.
4. Wu JY, Huang LM, Bai YN, Wu JY, Wei YG, Zhang ZB, et al. Imaging Features of Hepatocellular Carcinoma With Bile Duct Tumor Thrombus: A Multicenter Study. Front Oncol. 2021;11:723455.
5. Sun J, Wu J, Shi J, Liu C, Wei Y, Zhou J, et al. Thrombus-First Surgery for Hepatocellular Carcinoma with Bile Duct Tumor Thrombus. J Gastrointest Surg. 2021;25:1973-9.
6. Sun J, Wu J, Liu C, Shi J, Wei Y, Zhou J, et al. Typing of biliary tumor thrombus influences the prognoses of patients with hepatocellular carcinoma. Cancer Biol Med. 2021. DOI: 10.20892/j.issn.2095-3941.2020.0202.
7. Feng JK, Chen ZH, Sun JX, Wu JY, Guo WX, Shi J, et al. Concurrent bile duct resection versus concomitant thrombectomy for hepatocellular carcinoma associated with bile duct tumor thrombus: a propensity score matching analysis. Ann Transl Med. 2021;9:457.
8. Kim DS, Kim BW, Hatano E, Hwang S, Hasegawa K, Kudo A, et al. Surgical Outcomes of Hepatocellular Carcinoma With Bile Duct Tumor Thrombus: A Korea-Japan Multicenter Study. Ann Surg. 2020;271:913-21.
9. Feng JK, Wu YX, Chen ZH, Sun JX, Wang K, Chai ZT, et al. The effect of bile duct tumor thrombus on the long-term prognosis of hepatocellular carcinoma patients after liver resection: a systematic review and meta-analysis. Ann Transl Med. 2020;8:1683.
10. Chi Q, Shi Z, Zhang Z, Zhang X, Zhang L, Weng S. Outcomes of resection for hepatocellular carcinoma with macroscopic bile duct tumour thrombus: A propensity score matched study. Oncol Lett. 2020;20:118.
11. Yang X, Qiu Z, Ran R, Cui L, Luo X, Wu M, et al. Prognostic importance of bile duct invasion in surgical resection with curative intent for hepatocellular carcinoma using PSM analysis. Oncol Lett. 2018;16:3593-602.
12. Hu XG, Mao W, Hong SY, Kim BW, Xu WG, Wang HJ. Surgical treatment for hepatocellular carcinoma with bile duct invasion. Ann Surg Treat Res. 2016;90:139-46.
13. Ueda M, Takeuchi T, Takayasu T, Takahashi K, Okamoto S, Tanaka A, et al. Classification and surgical treatment of hepatocellular carcinoma (HCC) with bile duct thrombi. Hepatogastroenterology. 1994;41:349-54.

Session 10-4

Intra-arterial treatment of HCC with bile duct invasion

Shiro Miyayama

Department of Diagnostic Radiology, Fukui-ken Saiseikai Hospital, Fukui, Japan

Introduction

HCC infrequently invades the bile duct (bile duct tumor thrombus [BDTT]) and is often accompanied by obstructive jaundice. In cases of the serum total bilirubin concentration ≥3 mg/dL, either endoscopic or percutaneous biliary drainage should be performed, and treatment of BDTT is considered when the serum total bilirubin level decreases < 3 mg/dL (1). The ideal treatment for patients with BDTT is surgical resection; however, most patients are not candidates for surgery because of widely progressed tumors, an expected large resected liver volume, and/or poor hepatic function. Therefore, intraarterial treatment plays an important role in the treatment of unresectable BDTT.

Intraarterial treatment for BDTT

1. Transarterial chemoembolization

Superselective conventional transarterial chemoembolization (cTACE) is a first-line treatment for unresectable BDTT; however, BDTT can be easily necrotized and occasionally detaches and drops into the common bile duct (2,3). Therefore, we should aware the risk of obstructive jaundice and/or acute pancreatitis caused by sloughing of necrotized BDTT. The clinical symptoms and management of detached BDTT are similar to those of the impaction of choledocholithiasis. Endoscopic removal of detached BDTT or placement of a plastic tube stent is usually required. Hemobilia infrequently occurs during superselective cTACE when embolic agents are injected into the tumor vessels with slight force. Complete blockage of tumor-feeders by gelatin sponge particles is necessary to stop hemobilia.

2. Hepatic arterial infusion chemotherapy

HCC with BDTT is frequently accompanied with portal vein tumor thrombus (PVTT). When PVTT widely extends into the portal vein, hepatic arterial infusion chemotherapy (HAIC) is indicated. It is usually performed using an indwelling catheter placed in the hepatic artery. Low-dose FP (infusion of 5-fluorouracil and cisplatin) is a standard regime for HCC.

Efficacy of intraarterial treatment for BDTT

In a report regarding outcomes of 247 patients with BDTT, median survival time of patients who underwent surgical resection (SR), TACE, systemic chemotherapy, and best supportive care (BSC) were 11.5, 6.0, 2.4, and 1.6 months, respectively (P = 0.009 for SR vs. TACE; P < 0.001 for SR vs. systemic chemotherapy; P < 0.001 for SR vs. BSC; P = 0.005 for TACE vs. systemic chemotherapy; P < 0.001 for TACE vs. BSC; and P = 0.497 for systemic chemotherapy vs. BSC), and TACE was a significant prognostic factor by multivariate analysis (P < 0.001). Additionally, 166 (67.2%) patients had PVTT in their cohort (1). Therefore, TACE should be performed as selectively as possible to reduce adverse effects, such as hepatic failure. Furthermore, we should pay attention to the risk of migration of necrotized BDTT following TACE (2,3).

The outcomes of HAIC for BDTT have not been reported because the prognosis is manly influenced by the response to PVTT.

Bland embolization is also useful to stop hemobilia from BDTT and its application should not be delayed for patients with hyperbilirubinemia (4). Metallic stent placement bridging the viable BDTT should be avoided because it may cause repeated hemobilia.

Conclusions

Superselective cTACE should be attempted for unreselctable BDTT and HAIC is another option for extensive BDTT and/or accompanied PVTT. TACE is still an effective therapeutic option for selected patients with HCCs invading bile duct in the era of systemic therapy (5).

References

1. An J, Lee KS, Kim KM, et al. Clinical features and outcomes of patients with hepatocellular carcinoma complicated with bile duct invasion. Clin Mol Hepatol 2017; 23:160–169.
2. Hiraki T, Sakurai J, Gobara H, et al. Sloughing of intraductal tumor thrombus of hepatocellular carcinoma after transcatheter chemoembolization causing obstructive jaundice and acute pancreatitis. J Vasc Interv Radiol 2006; 17:583–585.
3. Okuda M, Miyayama S, Yamashiro M, et al. Sloughing of intraductal tumor thrombus of hepatocellular carcinoma after transcatheter arterial chemoembolization. Cardiovasc Intervent Radiol 2010; 33:619–623.
4. Kitagawa K, Yamakado K, Nakatsuka A, et al. Selective transcatheter hepatic arterial chemoembolization for hemobilia from hepatocellular carcinoma: report of three cases. J Vasc Interv Raol 1999; 10:1357–1360.
5. Miyayama S, Arai Y, Matsui O. Transarterial chemoembolization for hepatocellular carcinoma with vascular invasion. BJR 2022 (Epub ahead of print).

Session 10-5

External beam radiation therapy of hepatocellular carcinoma with bile duct invasion

Sang Min Yoon

Department of Radiation Oncology, Asan Medical Center University of Ulsan College of Medicine, Seoul, Korea

Hepatocellular carcinoma (HCC) with bile duct invasion is a rare clinical situation and its incidence is usually less than 10% according to the literature (1). Because obstructive jaundice is a main clinical presentation of the patients with HCC accompanying bile duct invasion, it is difficult to decide an optimal treatment (2). In addition, HCC with bile duct invasion is often accompanied by macroscopic vascular invasion, which is a poorer prognostic factor in these patients (3). However, the recent updated Barcelona Clinic Liver Cancer classification and the American Joint Committee on Cancer staging systems do not include the bile duct invasion as a variable for staging (4,5); there has been no recommended treatment options in these situations.

The role of external beam radiation therapy (RT) for HCC with bile duct invasion is rarely understood. However, the role of RT for control of macroscopic vascular invasion from HCC has been studied and its efficacy has been discovered in both prospective and retrospective studies (6-9). Therefore, RT can play a role in maintaining hepatic function and enabling to perform subsequent treatments by reducing bile duct invasion in these patients.

Here, we summarize previous studies and present the clinical outcomes of the role of RT for HCC with bile duct invasion.

References

1. Huang JF, Wang LY, Lin ZY, et al. Incidence and clinical outcome of icteric type hepatocellular carcinoma. J Gastroenterol Hepatol 2002;17:190-195.
2. An J, Lee KS, Kim KM, et al. Clinical features and outcomes of patients with hepatocellular carcinoma complicated with bile duct invasion. Clin Mol Hepatol 2017:23160-169.
3. Kasai Y, Hatano E, Seo S, et al. Hepatocellular carcinoma with bile duct tumor thrombus: surgical outcomes and the prognostic impact of concomitant major vascular invasion. World J Surg 2015;39:1485-1493.
4. Reig M, Forner A, Rimola J, et al. BCLC strategy for prognosis prediction and treatment recommendation: the 2022 update. J Hepatol 2022;76:681-693.
5. Chun YS, Pawlik TM, Vauthey JN. 8th Edition of the AJCC cancer staging manual: pancreas and hepatobiliary cancers. Ann Surg Oncol. 2018;25:845–847.
6. Yoon SM, Lim YS, Won HJ, et al. Radiotherapy plus transarterial chemoembolization for hepatocellular carcinoma invading the portal vein: long-term patient outcomes. Int J Radiat Oncol Biol Phys 2012;82:2004-2011.
7. Kim GA, Shim JH, Yoon SM, et al. Comparison of chemoembolization with and without radiation therapy and sorafenib for advanced hepatocellular carcinoma with portal vein tumor thrombosis: a propensity score analysis. J Vasc Interv Radiol 2015;26:320-329.
8. Yoon SM, Ryoo BY, Lee SJ, et al. Efficacy and safety of transarterial chemoembolization plus external beam radiotherapy vs sorafenib in hepatocellular carcinoma with macroscopic vascular invasion. JAMA Oncol 2018;4:661-669.
9. Jung J, Joo JH, Kim SY, et al. Radiologic response as a prognostic factor in advanced hepatocellular carcinoma with macroscopic vascular invasion after transarterial chemoembolization and radiotherapy. Liver Cancer 2022;11:152-161.

Session 11-1

The most dangerous game: What healthcare has yet to learn from the airline industry about safety

Ziv J. Haskal

University of Virginia, USA

This Lecture will examine aspects, scope and scale of medical errors beginning with a single example and then looking at health systems overall. It will identify common cultural aspects that prevent transparent discussions of error free of shame, institutional and cultural barriers to error reduction, and the goal of a 'just culture', and move to a higher level by identifying processes that have served the airline industry in achieving its consistent safety goals.

A few excerpted slides are included

Lessons Learned from the Airline Industry

Robust Voluntary Reporting
- Internal Quality Reports
- Joint Commission Sentinel Event Reporting
- Patient Safety Organizations
- Benchmarking

Infrastructure to support both Proactive and Reactive Problem-Solving
- Quality Reporting, Patient Safety and Risk Management, Quality and Performance Improvement
- Daily Management Systems
  - Huddling
  - Visual Management
  - Problem-Solving
  - Escalation

Reduce Competition on Safety
- Cooperation
- Legislation
- Measurement

Conclusions

"Professional colleagues who actively discuss errors in a safe and collaborative environment are more likely to identify and share learning opportunities (including errors), uncover a greater number of system-related issues that need to be optimized, continue to learn and improve as individuals and as organizations, feel more supported by their colleagues, and create a more constructive and supportive work environment, leading to better quality, greater teamwork, and decreased patient harm"

JACR 2020, Aug 6 Larson et al **Transitioning From Peer Review to Peer Learning: Report of the 2020 Peer Learning Summit**

Session 11-2

Radiation harzard for intervention

Edward Lee

UCLA Medical Center, USA

Educational Background

- MD/PhD/MSc – Georgetown University
- Radiology Residency - UCLA Medical Center
- Interventional Radiology Fellowship - UCLA Medical Center
- Oncologic Imaging Fellowship - UCLA Medical Center

Professional Career

- Professor of Radiology and Surgery – UCLA Medical Center
- Director of Interventional Radiology Residency – UCLA Medical Center
- Director of Research – UCLA Medical Center
- Fellow of Society of Interventional Radiology (FSIR)
- Diplomat and Examiner of American Board of Radiology

Research Field

- Portal hypertension; portal vein thrombosis; TIPS; BRTO; CARTO; PARTO
- Robotic Intervention Radiology
- Liver Cancer; Liver Biopsy; Lymphatic intervention; Tumor Ablation; Irreversible electroporation (IRE); Microwave Ablation (MWA)

Session 11-3

Ergonomics in interventional procedure: Endoscopic intervention

Jun Haeng Lee

Department of Medicine, Samsung Medical Center, Seoul, Korea

Endoscopy is a labor-intensive work not only mentally but also physically. To determine the prevalence and risk factors of work-related musculoskeletal disorders in gastrointestinal endoscopists in Korea. A survey of musculoskeletal symptoms, using a self-administered questionnaire, was conducted on 55 endoscopists practicing in general hospitals or health promotion centers. Forty-nine (89.1%) endoscopists reported musculoskeletal pain on at least one anatomic location and 37 (67.3%) endoscopists complained of pain at rest. Twenty-six (47.3%) endoscopists had severe musculoskeletal pain defined as a visual analogue score greater than 5.5. Factors related to the development of severe pain were (1) standing position during upper endoscopy, (2) specific posture/habit during endoscopic procedures, and (3) multiple symptomatic areas. Finger pain was more common in beginners, whereas shoulder pain was more common in experienced endoscopists. Sixteen percent of symptomatic endoscopists have modified their practice or reduced the number of endoscopic examinations. Only a few symptomatic endoscopists had sought professional consultation with related specialists. The prevalence of musculoskeletal pain in endoscopists is very high. The location of pain was different between beginners and experienced endoscopists. Measures for the prevention and adequate management of endoscopy-related musculoskeletal symptoms are necessary.

Session 11-4

Flexible robot technologies for advancement of endoscopic surgeries

Dong-Soo Kwon

Professor, Department of Mechanical Engineering, Director, Center for Future Medical Robotics, Korea Advanced Institute of Science and Technology, Daejeon, Korea, Founder CEO, ROEN Surgical Inc.

The successful clinical adaptation of the da Vinci system in laparoscopic surgeries demonstrated the benefits of robotic assistance such as precise and dexterous instrument motion and intuitive and ergonomic manipulation. In endoscopic surgery, performing complex surgical procedures is challenging due to limitations such as lack of instrument dexterity, and non-intuitive and burdensome endoscope manipulation. Since conventional robots using rigid instruments have a limitation in reaching the surgical site via narrow and tortuous pathways, surgical robots are gradually transiting to flexible systems to provide advantages of robotic assistance in endoscopic surgeries.

We have developed several flexible endoscopic robotic surgical systems in this context. The first robot system is an endoscopic attachable robot arm for tissue traction during endoscopic submucosal dissection(ESD). The robot arm facilitates the lifting of the mucosal flap during the ESD. It was demonstrated from several in-vivo animal trials that the robot arm assistance could reduce blind resection and perforation while increasing the dissection efficiency.

The second system is a flexible endoscopic robotic surgery system featuring a bendable overtube and multiple flexible surgical instruments. The robot can enhance the accessibility to the surgical site located in the curved and confined space, then provide complex surgical tasks such as dissection or suturing with intuitive teleoperation. The feasibility of the system in transoral surgery, gastrointestinal endoscopic surgery, and single port surgery has been demonstrated through several animal trials.

The third robot system is for retrograde intrarenal surgery for renal stone removal. The system provides intuitive and comfortable remote manipulation of ureteroscope and instruments by a single operator without wearing a lead gown. Moreover, the system provides automatic and safety functions for enhanced surgical efficiency and safety. A clinical study has been completed with a favorable stone-free rate compared to manual surgery and without any major complications.

Further advancement of such flexible robotic systems will overcome the limitations of a conventional endoscopy or a surgical robot and broaden the application of a minimum invasive surgery in various fields through transluminal and extraluminal approaches as well as an endoluminal approach.

Session 12-1

Percutaneous gallbladder drainage: From insertion to removal

Ji Hoon Shin

Department of Radiology, University of Ulsan College of Medicine, Asan Medical Center, Korea

Although cholecystectomy is the standard of care for acute cholecystitis, patients who are at high surgical risk or otherwise not candidates for surgery may benefit from percutaneous cholecystostomy (PC). This minimally invasive procedure may also be used as a temporizing measure in the acute phase until elective cholecystectomy is performed and in selected cases may be used as definitive therapy. In one report, the use of PC to manage acute cholecystitis increased from 13.9 to 48.2 procedures per 1000 admissions, whereas use of cholecystectomy decreased from 799.9 to 769.2 procedures per 1000 admissions.

Introduction

PC is usually performed in situations requiring decompression of the gallbladder or biliary tract such as acute cholecystitis or ascending cholangitis, as a sole treatment method (e.g., in the case of acalculous cholecystitis) or as a temporizing measure before more definitive therapy such as open or laparoscopic cholecystectomy. PC has also been used as an attempt to manage gallstones percutaneously, and as an initial approach to the biliary tree to manage other biliary pathologies such as biliary strictures.

Contraindications

PC does not have any absolute contraindications because of the life-threatening nature of the disease, in which other treatment options cannot be offered due to their risks. Hemorrhage may be a serious risk especially in patients with coagulopathy. Ascites may increase complexity of procedure and skin site leakage.

Postprocedural criteria for PC catheter removal

1) Enteral nutrition; patients' eating enteral nutrition stimulates antegrade flow of bile from the gallbladder. 2) Clinical improvement; Resolution of pain, fever, and leukocytosis indicates biliary decompress and confirms gallbladder as the source. 3) Cholecystostomy catheter tract maturity; Demonstration of fibrin tract without contrast leak into the peritoneum on contrast injection decreases the risk of bile peritonitis and abdominal abscess/sepsis after catheter removal. 4) Patent cystic duct; Confirmation of antegrade contrast flow from the gallbladder to bowel verifies that the gallstones are no longer causing obstruction.

Timing of catheter removal

Some PC catheters are removed as early as 7 to 10 days after placement without serious complications. Transhepatic drainage usually reveals mature fibrin tracts within 2 weeks, whereas transperitoneal drainage may take longer. The reason the PC tube is left for several weeks is to promote the formation of a fibrin sheath around the PC tube due to a secondary inflammatory response to the presence of the catheter. This theoretically prevents bile leaks and subsequent bile peritonitis; however, bile peritonitis is a rare complication even with catheters that may have been inadvertently removed.

A published review article on this topic found studies reporting catheter removal between 2 and 193 days, but there was no time point identified for an increased risk of bile leak or other serious complications. A tract injection should be performed via a sheath to ensure there is no intraperitoneal leakage prior to removal.

Alternative interventions

Various interventional techniques for managing cholelithiasis percutaneously have been studied and described. Percutaneous transcholecystic removal of gallstones from the common hepatic, cystic, and common bile ducts is possible. Metal stent placement of the cystic duct in the setting of acute cholecystitis with cystic duct obstruction secondary to malignancy has been reported. In addition, combined percutaneous/endoscopic interventions have been utilized for patients with challenging disease and biliary anatomy.

References

1. Wadhwa V, Trivedi PS, Makary MS, et al. Utilization and Outcomes of Cholecystostomy and Cholecystectomy in Patients Admitted With Acute Cholecystitis: A Nationwide Analysis. AJR Am J Roentgenol. 2021 Jun;216(6):1558-1565.
2. Antalek M Jr, Riaz A, Nemcek AA Jr. Gallbladder: Role of Interventional Radiology. Semin Intervent Radiol. 2021 Aug;38(3):330-339.
3. Okamoto K, Suzuki K, Takada T, et al. Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis. J Hepatobiliary Pancreat Sci. 2018 Jan;25(1):55-72.
4. Macchini D, Degrate L, Oldani M, et al. Timing of percutaneous cholecystostomy tube removal: systematic review. Minerva Chir 2016;71(06):415–426.
5. Kim SY, Lee S, Cho Y, Park SJ, Lee HN. Transcholecystic management of extrahepatic duct stones in poor candidates for endoscopic or transhepatic approaches. Eur Radiol. 2022 Mar;32(3):1709-1717.

Session 12-2

Endoscopic transpapillary gallbladder drainage: Strategy to improve clinical outcomes

Takuji Iwashita

First Department of Internal Medicine, Gifu University Hospital, Gifu, Japan

Introduction

Acute cholecystitis is an acute inflammatory disease of the gall bladder and is often caused by gallstones. Laparoscopic cholecystectomy is an ideal treatment soon after its onset if the patient's condition allows. However, in the cases of surgical high-risk patients, conservative management is generally performed with on-demand gallbladder drainage1. Percutaneous transhepatic gallbladder drainage (PTGBD) has been traditionally performed as a drainage method of the gallbladder. PTGBD is an effective treatment, although there are certain disadvantages, such as the requirement of external drainage tube placement or percutaneous needle puncture. Endoscopic transpapillary gallbladder drainage (ETGBD), including endoscopic nasogallbladder drainage (ENGBD) and endoscopic gallbladder stenting (EGBS), has been reported as an effective and safe management method for acute cholecystitis as an alternative one to PTGBD. More recently, EUS-guided gallbladder drainage (GBD) through the upper gastrointestinal tract has emerged as another drainage method for the gallbladder. Here, I want to review the strategy to improve clinical outcomes of ETGBD for acute cholecystitis in surgically high-risk patients.

Features of ETGBD

In the comparison of ETGBD to PTGBD or EUS-GBD, ETGBD has several potential advantages2. First, ETGBD might have a lower risk of bleeding because of the lack of requirement for needle puncture. Second, ETGBD could be applicable in patients with the anatomically unique location of the gallbladder where PTGBD or EUS-GBD cannot be performed, such as in the Chilaiditi syndrome. Third, simultaneous management of common bile duct stones could be performed. Additionally, external drainage is not required, which can potentially shorten the length of hospital stay and improve the quality of life (QOL). However, the pooled technical success rates of ETGBD was reported as 83.0% (95% confidence interval [CI], 80.1%–85.5%), which is lower than that reported for PTGBD (98.3%, 95% CI 98.0–99.1) or EUS-GBD (95.3%, 95% CI 92.8–96.9%), although no difference was seen in the rate of the adverse event. [3]

Factors affecting success rate of ETGBD

Actual technique of ETGBD

After successful bile duct cannulation, cholangiography was performed to evaluate the shape of the bile duct and the bifurcation form of the cystic duct. A 0.035- or 0.025-inch guidewire was advanced into the cystic duct and subsequently into the gallbladder. Another hydrophilic guidewire was used for seeking the cystic duct if it was difficult to place the guidewire into GB with the primary guidewire. Even in patients in whom the cystic duct was not visualized on the cholangiogram, seeking by guidewire was performed, to search for a blockage to the cystic duct. After successful placement of the guidewire into the gallbladder, Endoscopic sphincterotomy was performed in a standard manner using a papillotome over the guidewire. EGBS or ENGBD was then placed for GB drainage.

Factors affecting technical success of ETGBD

The most technically challenging step during ETGBD is a guidewire placement through the cystic duct. On top of the guidewire exchange to a hydrophilic one which has better guidewire torqueability, a catheter can be exchanged to a special device that has bending capability on the tip, such as Swing Tip Catheter. The catheter could be helpful in the negotiation of cannulation for cystic duct. It might be also useful to know the factors affecting the technical success of ETGBD in consideration of its indication. The factors, the presence of cystic duct stone, dilated common bile duct, and cystic duct direction or proximal and caudal branches were reported as a significant affecting technical failure of ETGBD 4. More recently, the usefulness of peroral cholangioscopy was reported for guidewire placement into the cystic duct under direct vision as salvage for fluoroscopy-guided one 5, which might be effective to improve the technical success rate of ETGBD.

Prevention of recurrence

After the improvement of acute cholecystitis by conservative management, its recurrence can occur at a certain rate after the removal of the drainage tube. In PTGBD, permanent placement of the drainage tube is not a practical choice since the tube could be accidental removal, which could lead to adverse events, and could deteriorate the quality of the life. However, in ETGBD, permanent placement of EGBS might be effective in patients who cannot undergo cholecystectomy after improvement of acute cholecystitis. Permanent placement of EGBS has been reported as an effective method to prevent the recurrence of cholecystitis, although the follow-up date was still not long enough 2, 6. Further evaluation is required to confirm its efficacy with a longer follow-up period and to compare long-term outcomes of EGBS with that of EUS-GBD.

Strategy to improve clinical outcomes

To improve clinical outcomes of ETGBD for acute cholecystitis in surgically high-risk patients, comprehensive consideration, regarding the severity of cholecystitis, anatomical or patient factors contraindicating the procedures, and the known possible factors affecting the technical success of ETGBD, is required to evaluate the indication of ETGBD and to achieve higher technical and clinical success rates. The placement length of ETGBD might be considered carefully, since the permanent placement might be useful to prevent the recurrence of acute cholecystitis, especially in patients who do not undergo cholecystectomy.

Conclusions

ETGBD is an effective management method for acute cholecystitis and its permanent placement also might be useful to prevent the recurrence, particularly in surgically high-risk patients. Further evolution is required for clinical outcomes in comparison to other procedures and the long-term outcomes of permanent placement of EGBS.

References

1. Okamoto K, Suzuki K, Takada T, et al. Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis. J Hepatobiliary Pancreat Sci 2018;25:55-72.
2. Maruta A, Iwashita T, Iwata K, et al. Permanent endoscopic gallbladder stenting versus removal of gallbladder drainage, long-term outcomes after management of acute cholecystitis in high-risk surgical patients for cholecystectomy: Multi-center retrospective cohort study. J Hepatobiliary Pancreat Sci 2021;28:1138-1146.
3. Mohan BP, Khan SR, Trakroo S, et al. Endoscopic ultrasound-guided gallbladder drainage, transpapillary drainage, or percutaneous drainage in high risk acute cholecystitis patients: a systematic review and comparative meta-analysis. Endoscopy 2020;52:96-106.
4. Maruta A, Iwata K, Iwashita T, et al. Factors affecting technical success of endoscopic transpapillary gallbladder drainage for acute cholecystitis. J Hepatobiliary Pancreat Sci 2020;27:429-436.
5. Ridtitid W, Piyachaturawat P, Teeratorn N, et al. Single-operator peroral cholangioscopy cystic duct cannulation for transpapillary gallbladder stent placement in patients with acute cholecystitis at moderate to high surgical risk (with videos). Gastrointest Endosc 2020;92:634-644.
6. Inoue T, Okumura F, Kachi K, et al. Long-term outcomes of endoscopic gallbladder stenting in high-risk surgical patients with calculous cholecystitis (with videos). Gastrointest Endosc 2016;83:905-13.

Session 12-3

EUS-guided gallbladder drainage: From beginners to experts

Se Woo Park

Division of Gastroenterology, Department of Internal Medicine, Hallym University Dongtan Sacred Heart Hospital, Hallym University College of Medicine, Korea

INTRODUCTION

Endoscopic ultrasound (EUS)-guided drainage procedures are potentially disruptive technologies as the alternatives to invasive surgery; thus, the therapeutic strategies are undoubtedly undergoing a paradigm shift toward the minimally invasive treatments, although a number of devices and techniques are being developed for easier and safer procedures. Among these, EUS-guided gallbladder GB drainage (EUS-GBD) using the lumen-apposing metal stent (LAMS) or dedicated self-expandable metal stent (SEMS) with bidirectional anti-migratory flanges is not only safe and reliable for acute cholecystitis, but it also improves the quality of life in patients who are barely suitable for surgical treatment. By contrast with acute cholecystitis in non-malignant patients, cholecystitis after biliary stent placement for unresectable MBO may have limited treatment options because it is barely suitable for surgical treatment.[1, 2] As an alternative treatment, percutaneous transhepatic gallbladder drainage (PTGBD) is more frequently performed and is almost the universally available option. Nevertheless, this procedure is only a temporary measure for controlling symptoms, leads to inconvenience and painful discomfort, and might require adjustment and learning to care for an external drain catheter manipulation. Given the non-physiologic drainage of the bile juice and long-standing catheter-related adverse events of PTGBD, endoscopic ultrasound-guided transmural gallbladder drainage (EUS-GBD) has become a reasonable alternative to PTGBD as a less invasive and comfortable solution to these concerns.[3] Many studies reported that EUS-GBD has similar technical and clinical success compared with PTGBD, and it consumes fewer hospital resources and results in fewer adverse events. This review focuses on the technical tip, suitable selection of a specific stent, and clinical outcomes as well as future perspectives for EUS-GBD.

TECHNICAL TIPS OF EUS-GBD

EUS-GBD can be performed by the conventional technique or direct puncture with a cautery enhanced delivery system. Regardless of the technique, the endoscopist also needs to decide on the site of puncture. The gallbladder can be drained from the distal gastric antrum and the duodenum.[4] Depending on the puncture site, the access site at the gallbladder will vary. The gallbladder is generally accessed at the neck or infundibulum through punctures from duodenum. Meanwhile, the gallbladder is accessed at the fundus or body through puncture at the distal gastric antrum. In general, the neck or body of the gallbladder is chosen as the optimal target for puncture under the guidance of EUS.[5] The factors affecting the selection of puncture site involve presence of vessels between the gastric or duodenal wall and the gallbladder wall, presence of duodenal stenosis and the distance between the gastric or duodenal wall to the gallbladder wall. However, it should be noted that transgastric punctures may be increase the risk of stent migration or even dislocation as stomach is relatively more mobile. Stent migration could result in bile leakage into the peritoneal space, which may lead to bile peritonitis.[6] Furthermore, there may be a risk of food impaction in the gallbladder and also the risk of buried stent syndrome. However, Teoh et al.[7] has reported that both antral and duodenal puncture routes share similar clinical and technical success rate and risk of adverse events. Nevertheless, it is the author's preference to drain the gallbladder from the duodenum.

STENT SELECTION FOR EUS-GBD

EUS-GBD can be performed using either a transgastric or transduodenal approach. It is important to identify an approach achieving close anatomical apposition between the GB neck as the target point and the gastrointestinal tract (stomach or duodenum) and maintain a stable echoendoscope position for the safe placement of the stent.[3, 8] To date, there is a lack of evidence to support the advantages and disadvantages of either approach. In general, the duodenum is a suitable puncture site because it is located in the retroperitoneum and has close proximity to the GB neck for stable tract formation, while the stomach has a long distance from the GB neck and frequent peristaltic movements that can lead to outward or inward stent migration into the GB with subsequent bleeding and recurrent cholecystitis.[9-11] In only cases of potential candidates for subsequent cholecystectomy, the transgastric approach can be the preferable option because of the easier closure of the gastric wall defect by surgeons during cholecystectomy than duodenal closure despite a higher rate of AEs.[12]

Use of the plastic stent

In the early days, EUS-GBD was performed using plastic stents, similar to EUS-guided PFC or BD drainage (Figure 1).[13] However, a tamponade effect by the hepatic parenchyma cannot be expected with EUS-GBD, which is seen with EUS-guided HGS, because the interspace between the GB and stomach/duodenum is the free space of the peritoneum.[14] Therefore, bile leakage can occur along the fistula beside the plastic stent.[15] However, Jang et al. reported that no bile leakage or peritonitis occurred in patients who underwent EUS-GBD using a 5-Fr naso-biliary drainage tube. They assumed that bile leakage through the puncture site can be prevented by the adherence of an inflamed GB wall to adjacent structures. In addition, the patency of the plastic stent is relatively shorter than that of the SEMS. Despite several limitations, the use of a plastic stent can be a reasonable option if the patient is likely to consider potentially sequential cholecystectomy in the future. In the same study[14], they demonstrated that laparoscopic cholecystectomy was successfully conducted in 23 (79.3%) of 29 patients who underwent EUS-GBD and only two patients required conversion to open cholecystectomy. The authors concluded that EUS-guided GB drainage does not result in significant adhesions or inflammation impedimental for cholecystectomy between the GB and duodenum. Therefore, laparoscopic cholecystectomy can be safely performed even in patients undergoing EUS-guided GB drainage without technical difficulty.

Use of the SEMS

As mentioned earlier in EUS-guided PFC drainage, the SEMS has the theoretical advantage of a larger diameter even in EUS-GBD compared with plastic stents for patients unfit for surgical cholecystectomy. First, it can prevent bile leakage between the stent and fistula tract of the GB wall by self-expanding radial force, although small amounts of bile juice can leak during tract dilation before stent deployment. Clinically, therefore, the risk of bile peritonitis can be decreased.[16] With the same mechanism, the use of the SEMS provides a tamponade effect enabling spontaneous hemostasis by the stent itself.[14] Second, the SEMS can be withdrawn and recaptured if the outer sheath of the delivery system is not pulled until the red marker as the maximal limit point permitting reconfiguration. Thus, the endoscopist can easily readjust the stent position when stent mispositioning is expected before full deployment. Third, it has a larger diameter, which can prevent frequent clogging by food materials or sludges in the GB and thus promote longer stent patency.[14] However, the conventional tubular SEMS without anti-migratory flanges is associated with a higher risk of stent migration and even bile leakage/peritonitis due to technical difficulty in achieving appropriate positioning during deployment. To overcome stent migration, the modified tubular SEMS with anti-migratory flanges was introduced by Lee et al.[17] This stent (BONA-AL Stent; Standard Sci Tech Inc., Seoul, Korea) was a PCSEMS containing a nitinol wire covered with a silicone membrane (Figure 2). The stents were 10 mm in diameter and 4–7 cm in length with enlarging the flares (22-mm external diameter), building 90° angulation. In previous studies[18, 19], no patient actually experienced bile leakage and peritonitis. As another technique for preventing stent migration, several studies recommended the combination insertion of the DPPS within the SEMS because the DPPS remains in the GB if the SEMS is migrated and the maintained fistula can allow revision.[14, 20, 21] In a recent systematic review[15] regarding clinical outcomes according to the stent type in EUS-GBD, the overall rate of AEs was lower in the SEMS than in the plastic stent; thus, it can be preferable for preventing procedure-related AEs in patients who are not likely to undergo future cholecystectomy.

Use of the LAMS

In terms of EUS-GBD, the theoretical advantage of the LAMS over the plastic stent or tubular SEMS is the ability to appose the GB wall tightly to the intestinal wall, which can prevent potential bile leakage by the sealing-off effect and inner or outer stent migration (Figure 3).[22] Furthermore, it has a larger diameter, which can allow better efficacy of drainage. In a recent report[23], the LAMS can be used for various transluminal interventions for intra-cholecystic pathologies such as peroral cholecystoscopy using a magnifying endoscope or confocal endomicroscopy. In addition, interventional cholecystoscopy can be useful for GB stone removal with holmium laser lithotripsy.

In stent selection, physicians determine the diameter and length of the LAMS based on the anatomical position of the GB related to the duodenum/stomach, GB wall thickness or stiffness, or size of GB stones.[8] Despite the improvement and increasing use of the LAMS, several studies demonstrated that the additional insertion of the plastic stent or tubular SEMS within the LAMS could be useful for the prevention of stent occlusion or migration, particularly in patients in whom it is intended to remain in situ indefinitely. A recent systematic review reported that the pooled technical and clinical success rates of the LAMS were 95.2% and 96.7%, respectively. In terms of AEs, the rates of recurrence of cholecystitis, bleeding, and stent migration were acceptable as 5.1%, 2.6%, and 1.1%, respectively.

COMPARATIVE OUTCOMES IN EUS-GUIDED GALLBLADDER DRAINAGE

Studies comparing the efficacy of EUS-GBD to PTGBD have found similar clinical success in the two groups; however, adverse events, post-procedure pain scores, length of stay and need for repeat interventions were fewer in the endoscopic group.[24] In a study by Irani et al., the number of reinterventions per patient was 2.5±2.8 in the PTGBD group, as compared to 0.2 0.4 in the EUS-GBD group. In addition, the median pain scores and post-procedure length of hospital stay were also lower in the EUS-GBD group.

The largest study comparing ERCP with cystic duct stent placement to EUS-GBD in patients unfit for cholecystectomy was performed in Japan by Oh et al.[11] This study retrospectively assessed 172 patients with 76 in the ERCP group and 96 in the EUS-GBD group. The procedural success rate was 83.3% for ERCP and 100% in EUS-GBD. In the 16 failed ERCPs, 12 were due to inability to selectively cannulate the cystic duct and 4 were due to nonvisualization of the cystic duct on fluoroscopy as a result of obstruction. These patients went on to PTGBD (n = 3), medical treatment (n = 6), and 7 crossed over to EUS-GBD with 100% technical success. The rate of procedural adverse events was similar between ERCP and EUS-GBD at 9.4% and 7.2%, respectively. Of note, recurrent cholecystitis or cholangitis occurred at a higher rate in the ERCP group (17.4%) as compared to the EUS-GBD group (3.9%).

FUTURE DIRECTIONS OF EUS-GUIDED GALLBLADDER DRAINAGE

Despite significant advances in stent technology, EUS-GBD remains a challenging technical feat, often owing to an unstable scope position in the duodenal bulb, decompressed gallbladder, or gallbladder distance from the gastrointestinal lumen. A major obstacle to widespread use of EUS-GBD is the challenge in targeting the gallbladder if it is not in the immediate vicinity of the gastrointestinal lumen or if it is insufficiently distended. To address the issues related to the proximity of the gallbladder, Zhang et al.[25] have investigated the use of a retrievable puncture anchor traction method in a porcine model. These investigators utilized a specialized T-tag to approximate and immobilize the gallbladder to facilitate EUS-GBD followed by removal of the T-tag at the end of the procedure. Use of this method significantly improved the technical success rate of EUS-GBD without issues of gallbladder collapse leading to stent maldeployment. Ultimately, this method may become the standard approach for EUS-GBD, but time will tell.

CONCLUSIONS

In conclusion, EUS-GBD has been shown to be an effective means of achieving gallbladder drainage with superior efficacy to PT-GBD and ET-GBD in patients deemed at high-risk for LC. The procedure also creates portal for removing gallstones resulting in low rates of recurrent AC. Further studies are required to assess if the procedure is suitable in a selected group of surgically fit patients.

REFERENCES

1. Antoniou SA, Antoniou GA, Koch OO, Pointner R, Granderath FA: Meta-analysis of laparoscopic vs open cholecystectomy in elderly patients. World J Gastroenterol 2014, 20(46):17626-17634.
2. Dubecz A, Langer M, Stadlhuber RJ, Schweigert M, Solymosi N, Feith M, Stein HJ: Cholecystectomy in the very elderly--is 90 the new 70? J Gastrointest Surg 2012, 16(2):282-285.
3. Dollhopf M, Larghi A, Will U, Rimbas M, Anderloni A, Sanchez-Yague A, Teoh AYB, Kunda R: EUS-guided gallbladder drainage in patients with acute cholecystitis and high surgical risk using an electrocautery-enhanced lumen-apposing metal stent device. Gastrointest Endosc 2017, 86(4):636-643.
4. Ogura T, Higuchi K: Endoscopic ultrasound-guided gallbladder drainage: Current status and future prospects. Dig Endosc 2019, 31 Suppl 1:55-64.
5. Penas-Herrero I, de la Serna-Higuera C, Perez-Miranda M: Endoscopic ultrasound-guided gallbladder drainage for the management of acute cholecystitis (with video). J Hepatobiliary Pancreat Sci 2015, 22(1):35-43.
6. Imai H, Kitano M, Omoto S, Kadosaka K, Kamata K, Miyata T, Yamao K, Sakamoto H, Harwani Y, Kudo M: EUS-guided gallbladder drainage for rescue treatment of malignant distal biliary obstruction after unsuccessful ERCP. Gastrointest Endosc 2016, 84(1):147-151.
7. Teoh AYB, Serna C, Penas I, Chong CCN, Perez-Miranda M, Ng EKW, Lau JYW: Endoscopic ultrasound-guided gallbladder drainage reduces adverse events compared with percutaneous cholecystostomy in patients who are unfit for cholecystectomy. Endoscopy 2017, 49(2):130-138.
8. Jain D, Bhandari BS, Agrawal N, Singhal S: Endoscopic Ultrasound-Guided Gallbladder Drainage Using a Lumen-Apposing Metal Stent for Acute Cholecystitis: A Systematic Review. Clin Endosc 2018, 51(5):450-462.
9. Walter D, Teoh AY, Itoi T, Perez-Miranda M, Larghi A, Sanchez-Yague A, Siersema PD, Vleggaar FP: EUS-guided gall bladder drainage with a lumen-apposing metal stent: a prospective long-term evaluation. Gut 2016, 65(1):6-8.
10. Cho SH, Oh D, Song TJ, Park DH, Seo DW, Lee SK, Kim MH, Lee YN, Moon JH, Lee SS: Comparison of the effectiveness and safety of lumen-apposing metal stents and anti-migrating tubular self-expandable metal stents for EUS-guided gallbladder drainage in high surgical risk patients with acute cholecystitis. Gastrointest Endosc 2020, 91(3):543-550.
11. Irani S, Ngamruengphong S, Teoh A, Will U, Nieto J, Abu Dayyeh BK, Gan SI, Larsen M, Yip HC, Topazian MD et al: Similar Efficacies of Endoscopic Ultrasound Gallbladder Drainage With a Lumen-Apposing Metal Stent Versus Percutaneous Transhepatic Gallbladder Drainage for Acute Cholecystitis. Clin Gastroenterol Hepatol 2017, 15(5):738-745.
12. Sobani ZA, Ling C, Rustagi T: Endoscopic Ultrasound-Guided Gallbladder Drainage. Dig Dis Sci 2020.
13. Jang JW, Lee SS, Song TJ, Hyun YS, Park DY, Seo DW, Lee SK, Kim MH, Yun SC: Endoscopic ultrasound-guided transmural and percutaneous transhepatic gallbladder drainage are comparable for acute cholecystitis. Gastroenterology 2012, 142(4):805-811.
14. Choi JH, Lee SS, Choi JH, Park DH, Seo DW, Lee SK, Kim MH: Long-term outcomes after endoscopic ultrasonography-guided gallbladder drainage for acute cholecystitis. Endoscopy 2014, 46(8):656-661.
15. Khan MA, Atiq O, Kubiliun N, Ali B, Kamal F, Nollan R, Ismail MK, Tombazzi C, Kahaleh M, Baron TH: Efficacy and safety of endoscopic gallbladder drainage in acute cholecystitis: Is it better than percutaneous gallbladder drainage? Gastrointest Endosc 2017, 85(1):76-87 e73.
16. Baron TH, Topazian MD: Endoscopic transduodenal drainage of the gallbladder: implications for endoluminal treatment of gallbladder disease. Gastrointest Endosc 2007, 65(4):735-737.
17. Jang JW, Lee SS, Park DH, Seo DW, Lee SK, Kim MH: Feasibility and safety of EUS-guided transgastric/transduodenal gallbladder drainage with single-step placement of a modified covered self-expandable metal stent in patients unsuitable for cholecystectomy. Gastrointest Endosc 2011, 74(1):176-181.
18. Moon SH, Kim MH, Park DH, Song TJ, Eum J, Lee SS, Seo DW, Lee SK: Modified fully covered self-expandable metal stents with antimigration features for benign pancreatic-duct strictures in advanced chronic pancreatitis, with a focus on the safety profile and reducing migration. Gastrointest Endosc 2010, 72(1):86-91.
19. Park DH, Kim MH, Moon SH, Lee SS, Seo DW, Lee SK: Feasibility and safety of placement of a newly designed, fully covered self-expandable metal stent for refractory benign pancreatic ductal strictures: a pilot study (with video). Gastrointest Endosc 2008, 68(6):1182-1189.
20. Takagi W, Ogura T, Sano T, Onda S, Okuda A, Masuda D, Imoto A, Takeuchi T, Fukunishi S, Higuchi K: EUS-guided cholecystoduodenostomy for acute cholecystitis with an anti-stent migration and anti-food impaction system; a pilot study. Therap Adv Gastroenterol 2016, 9(1):19-25.

21. Kahaleh M, Perez-Miranda M, Artifon EL, Sharaiha RZ, Kedia P, Penas I, De la Serna C, Kumta NA, Marson F, Gaidhane M et al: International collaborative study on EUS-guided gallbladder drainage: Are we ready for prime time? Dig Liver Dis 2016, 48(9):1054-1057.
22. Irani S, Baron TH, Grimm IS, Khashab MA: EUS-guided gallbladder drainage with a lumen-apposing metal stent (with video). Gastrointest Endosc 2015, 82(6):1110-1115.
23. Chan SM, Teoh AYB, Yip HC, Wong VWY, Chiu PWY, Ng EKW: Feasibility of per-oral cholecystoscopy and advanced gallbladder interventions after EUS-guided gallbladder stenting (with video). Gastrointest Endosc 2017, 85(6):1225-1232.
24. Kedia P, Sharaiha RZ, Kumta NA, Widmer J, Jamal-Kabani A, Weaver K, Benvenuto A, Millman J, Barve R, Gaidhane M et al: Endoscopic gallbladder drainage compared with percutaneous drainage. Gastrointest Endosc 2015, 82(6):1031-1036.
25. Zhang K, Sun S, Guo J, Wang S, Ge N, Liu X, Wang G: Retrievable puncture anchor traction method for EUS-guided gallbladder drainage: a porcine study. Gastrointest Endosc 2018, 88(6):957-963.

FIGURE and FIGURE LEGENDS

Figure 1

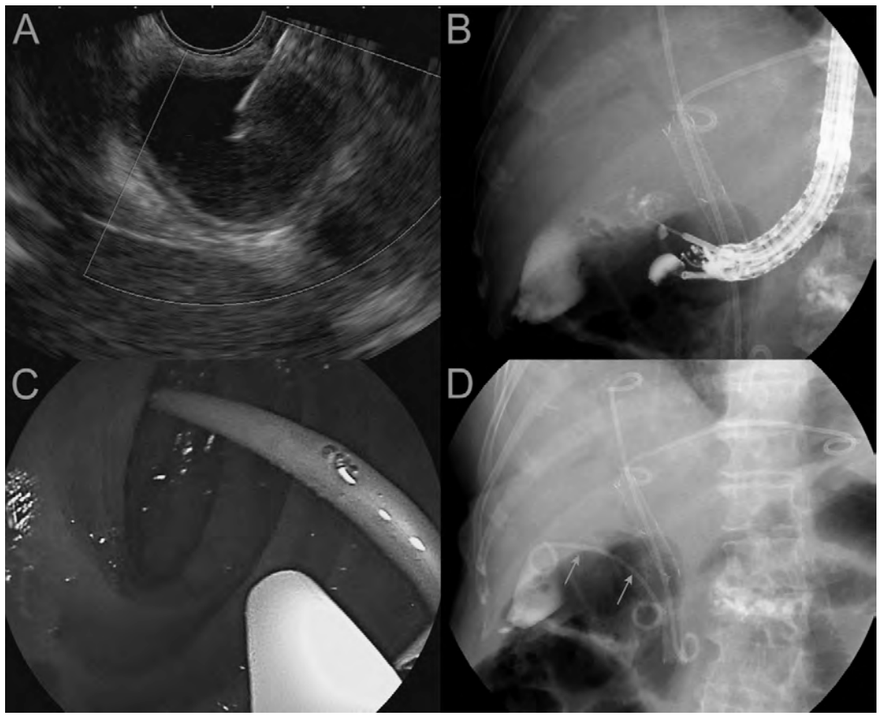


Figure 1. Endoscopic ultrasound-guided gallbladder (GB) drainage using the 7-Fr double-pigtail plastic stent (DPPS) for obstructive cholecystitis after biliary stent placement. (A) Endosonographic image showed a markedly dilated GB containing large amounts of sludge and heterogeneous debris. (B) Fluoroscopic image showed a 19-gauge needle puncture into the GB neck portion. (C) Endoscopic image showed the 7-Fr DPPS placed in the duodenum. (D) Fluoroscopic image showed the 7-Fr DPPS (yellow arrows) placed between the duodenum and the GB.

Figure 2

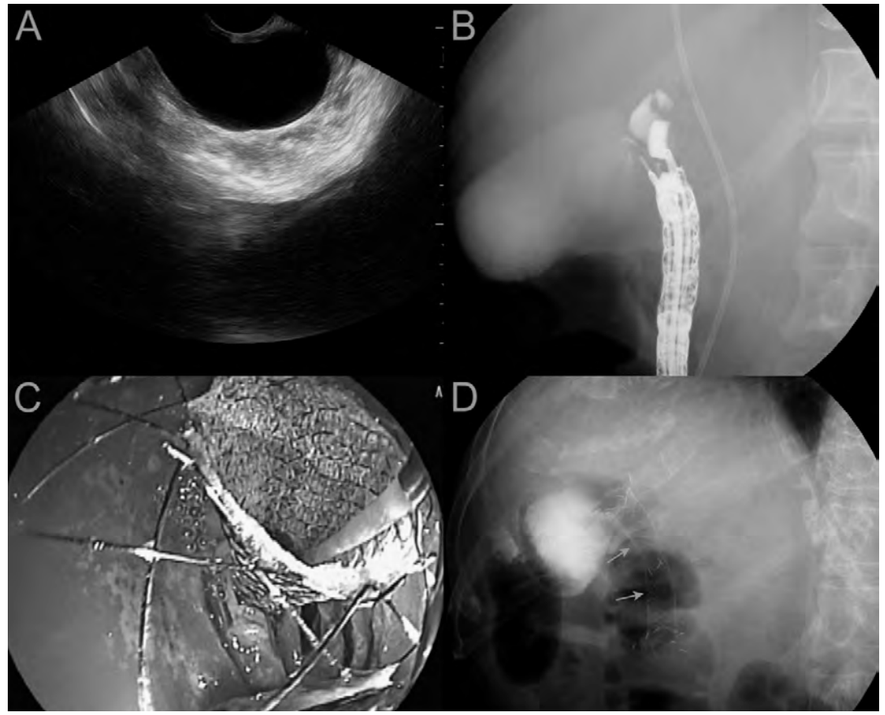


Figure 2. Endoscopic ultrasound-guided gallbladder (GB) drainage using the dedicated bi-flanged fully covered self-expandable metal stent (FCSEMS) (BONA-AL Stent; Standard Sci Tech Inc., Seoul, Korea) for cholecystitis. (A) Endosonographic image showed a markedly dilated GB. (B) The GB is punctured using a 19-gauge needle, and the contrast medium is injected. (C) Endoscopic image showed the drainage of pus-like materials through the dedicated bi-flanged FCSEMS. (D) Fluoroscopic image showed the dedicated bi-flanged FCSEMS placed between the duodenum and the GB.
GB.

Figure 3

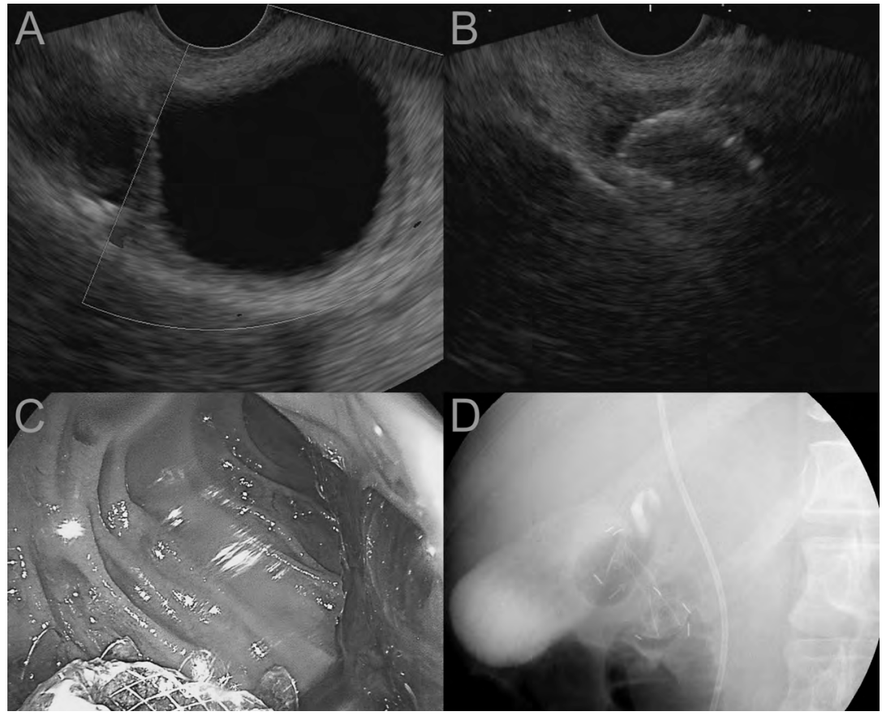


Figure 3. Endoscopic ultrasound-guided gallbladder (GB) drainage using the dedicated bi-flanged lumen-apposing metal stent (LAMS) (Niti-S SPAXUS; Taewoong Medical Co., Ltd, Ilsan, South Korea) for cholecystitis. (A) Endosonographic image showed a markedly dilated GB. (B) Endosonographic image showed deployed distal flange of the LAMS within the GB lumen. (C) Endoscopic image showed the drainage of pus-like materials through the dedicated bi-flanged LAMS in EUS-guided GB drainage (proximal flange of the LAMS in the duodenal bulb). (D) Fluoroscopic image showed the dedicated bi-flanged LAMS between the duodenum and the GB (distal flange of the LAMS deployed within the GB lumen).

Session 12-4

Cholecystectomy: When and how

Woohyung Lee

Division of Hepatobiliary and Pancreatic Surgery, Department of Surgery, Asan Medical Center, University of Ulsan College of Medicine, Korea

Introduction

Gallbladder (GB) stone is one of the common benign biliary disease, and 10% of the population in Korea have gallbladder stone, and 80% are asymptomatic. Of them, 1-4% of cholelithiasis patients experience gallbladder stone related complications such as acute cholecystitis (AC) annually. Known risk factors of AC are gallstone, obesity, rapid weight loss, pregnancy, alcohol drink (7-14g/d), congenital hemolytic anemia, and octreotide use.

Pathogenesis of AC is originated from obstruction of cystic duct. This event increased intracystic pressure, and causes inflammatory response. Gallbladder congestion and edema occurs within 2-4 days following microvascular occlusion around gallbladder epithelium. Ten percent of AC patients could experience gallbladder necrotic perforation.

Severity of acute cholecystitis

Diagnosis of AC was described in Tokyo guideline 2018, which comprised of local symptom (Murphy`s sign, and RUQ tenderness), systemic signs (fever, elevated CRP, WBC), and definite imaging findings (GB distention, wall, wall thickening, pericholecystic fluid collection). They used grade I, II, and III AC according to the severity including severe local inflammation, and accompanied organ dysfunction, which is related with sepsis. There are several risk assessment tools such as Charlson comorbidity index, American Society of Anesthesiologists Physical Status, Portsmouth Physiological and Operative Severity Score for the enumeration of Morality and morbidity. Recently, elderly patients have been increasing, and clinical outcomes of cholecystectomy for octogenarian, and nanogenarian are reported, and the characteristics of geriatric patients are decreased physical reservoir against stress and cognitive function are important factor for evaluation. Therefore, frailty score is reserved for evaluation of geriatric patients.

Surgical treatment of acute cholecystitis for high risk patients

Who is high risk patients of cholecystectomy for AC? As previous studies reported, surgeons are reluctant for surgical management for complicated cholecystitis, AC with liver cirrhosis, AC during pregnancy AC with multiple comorbidities because morbidities and mortality in these patients are higher than those in ordinary AC. Many studies showed various external and internal drainages of infected bile in gallbladder is efficient management for high risk patients. However, surgery is still the last resort for intractable patients even after proper drainage.

Complicated cholecystitis comprised of GB empyema, perforation, and cholecystoenteric fistula, which needs challenging surgical procedures and patients could experience vasculobiliary injury (VBI). Intraoperative findings are useful to evaluate severity and difficulty for AC. There are characteristic findings such as non-visible gallbladder, fibrotic adhesion around calot`s triangle, necrotic, edematous change of gallbladder. Parkland classification was established base on these features, and it showed difficulty of surgical procedure, and related with severity of AC. Usual surgical procedures for AC included following steps. Effective retraction and dissection from posterior leaf of the peritoneum covering the GB neck and exposing cystic duct is essential. Dissecting the lower part of the GB bed and identification of critical view of safety is the last step for safe cholecystectomy. Bail-out procedures could be applied for complicated

cholecystitis. Open conversion is next easy option. Fundus first approach is reasonable procedures because fundus without inflammation is relatively easy to dissect compared with fibrotic infundibulum, and dissection of fibrotic calot`s triangle could make VBI including injury of collateral vessels in cirrhotic liver patients. Sometimes, subtotal cholecystectomy could be performed instead of total cholecystectomy, and fenestrating, and reconstituting is next step for subtotal cholecystectomy.

Conclusions

External and internal drainage for high risk patients of AC is useful and considerable management considering comparable clinical outcomes. However, surgical management is still last resort for intractable patients even after proper drainage.

Session 13-1

A new perspective to prevent bleeding after EMR/ESD - ulcer closure

Raymond E. Kim

Associate Professor of Medicine, Division of Gastroenterology and Hepatology,
University of Maryland School of Medicine, USA

Educational Background

Education

1998 - 2005 M.D. (Doctor of Medicine), School of Medicine, Ajou University, South Korea

Post Graduate Education and Training

2008 - 2011 Residency, Department of Internal Medicine, University of Kansas Medical Center, KS, USA
2011 - 2014 Fellowship, Gastroenterology and Liver Disease, George Washington University, Washington, DC., USA
2014 - 2015 Advanced Endoscopy Fellowship, Division of Gastroenterology and Hepatology, University of Maryland Medical Center, Baltimore, MD, USA

Professional Career

Academic Appointments

2014-2015 Visiting Instructor, Division of Gastroenterology and Hepatology, University of Maryland School of Medicine
2015-2021 Assistant Professor of Medicine, Division of Gastroenterology and Hepatology, University of Maryland School of Medicine
2021-present Associate Professor of Medicine, Division of Gastroenterology and Hepatology, University of Maryland School of Medicine

Institutional Service

2015-Present Division of Gastroenterology and Hepatology Compliance Officer, UMMC
2016-Present UMMC DOM Compliance Committee
2015-2016 Director of Endoscopy, University of Maryland Midtown Campus
2016-Present Head, Division of Gastroenterology and Hepatology, University of Maryland Midtown Campus
2017-Present SOM council alternate member
2019-Present Senator, UMB Faculty Senate

Research Field

ESD, endoscopic suturing, POEM, endoflip

Session 13-2

Gastric per-oral endoscopic myotomy in patients with lung transplant

Andrew A Li, Woosung Kim, Andrew Ofosu, Alexander Podboy, Micaela Esquivel, Joo Ha Hwang

Division of Gastroenterology and Hepatology, Stanford University School of Medicine, Stanford, CA, USA

Introduction

Gastroparesis is a disorder of symptomatic delayed gastric emptying in the absence of mechanical obstruction. Symptoms include nausea, retching, vomiting, bloating, early satiety, and abdominal pain (1). There is a high incidence of gastroparesis in patients who undergo lung transplantation, with an incidence estimated to be between 23% and 91% (2). Gastroparesis is particularly problematic in the post-lung transplant population because of its association with gastroesophageal reflux disease and aspiration, increased risk of bronchiolitis obliterans syndrome, and complicating immunosuppression management (3, 4). It is hypothesized to be a consequence of vagal nerve injury during lung transplantation that leads to gastric hypomotility and pylorospasm; pylorospasm is characterized by high amplitude and prolonged pyloric contractions(5).

The treatment of gastroparesis is challenging. First-line treatment is centered around dietary changes and medical management with prokinetic agents (1). However, the efficacy of prokinetic drugs is limited, and they are also associated with tachyphylaxis and side effects (6-8). Advances in endoscopic submucosal dissection techniques have led to the development of endoscopic myotomy as a therapeutic technique for the treatment of pylorospasm and gastroparesis. Gastric peroral endoscopic myotomy (GPOEM) was introduced in humans in 2013 as a treatment for pylorospasm (9) and consists of five stages: initial endoscopic inspection; mucosotomy; submucosal tunnel formation; pyloric myotomy; and mucosal closure. Potential complications include capnomediastinum, capnoperitoneum, gastric ulceration, and GI bleeding (10).

Recent prospective trials have demonstrated the clinical efficacy of GPOEM in the treatment of gastroparesis with improvement in Gastroparesis Cardinal Symptom Index (GCSI), including a trial that included a sham procedure arm(11-13). In a post-lung transplant population, a recent multicenter experience described clinical success in 17 of 20 patients based on improvement in GCSI and its subscales. However, there are few additional data describing outcomes in lung transplant patients with gastroparesis. To this end, we performed a retrospective analysis of our experience at an academic tertiary medical center, examining outcomes related to clinical efficacy (GCSI), gastric emptying, and hospital admissions before and after GPOEM in a lung transplant population.

Methods

This study was a retrospective analysis of consecutive lung transplant patients who underwent GPOEM between April 2018 and December 2021 at a single U.S. tertiary care center for the management of symptomatic gastroparesis refractory to standard medical therapy. The primary outcome was clinical success-based improvement in the GCSI. Secondary outcomes included technical success, adverse events (AEs), hospital admissions, and change in gastric emptying scintigraphy (GES).

When patients were evaluated in clinic, we routinely collected GCSI scores before and after the procedure. For clinical success, we performed analyses using several previously published definitions utilizing the GCSI to compare our data to prior studies: (1) any decrease in GCSI; (2) at least a 1-point decrease in the overall GCSI (averaged over the three subscales); and (3) at least a 1-point decrease overall GCSI (averaged over the three subscales) and at least a 25% decrease of 2 of the 3 subscales. If multiple follow-up GCSI data were available for a patient, the most recent data was used.

Hospital admission data were also collected for the year immediately preceding and the year immediately following GPOEM. To determine the frequency of hospital admission, the annual frequency was corrected for the duration of onset of symptoms or length of follow-up available. We collected data for hospital admission for all causes, as well as for gastroparesis-related hospital admissions which were defined as those where the patient presented with symptoms suggestive of gastroparesis (nausea, vomiting, inability to tolerate oral intake, otherwise unexplained abdominal pain), had sequelae of gastroparesis (aspiration pneumonia, dehydration), or required active inpatient management of gastroparesis (gastroenterology consultation and/or procedures).

Gastric emptying scintigraphy data were collected. The vast majority of these studies were using a standardized protocol with a low-fat, egg white meal labeled with radioactive technetium with imaging at 0, 1, 2, 3, and 4 hours after meal ingestion. Our analysis of gastric emptying was limited to patients in which scintigraphy was obtained; we did not include data from wireless motility study for the gastric emptying data.

Data analysis was performed using R (R Foundation for Statistical Computing, Vienna, Austria). P values were calculated using nonparametric tests for all comparisons with a Mann-Whitney U test, and the null hypothesis was rejected if $p<0.05$. All reported P values were 2-sided and nominal.

Results

A single endoscopist performed GPOEMs on 35 lung transplant patients over the study period (Table 1). The mean age of patients at the time of GPOEM was 52.4 years (SD 12.1), and 52.8% of patients were female. Patients had a mean duration of symptoms of 17.7 months (SD 23.5) at the time of GPOEM. All patients had undergone at least 1 session of intrapyloric Botox prior to GPOEM with 86.1% reporting improvement after Botox, albeit temporarily. Treatments before GPOEM included prokinetic medications in 72% of patients.

All GPOEMs were technically successful, and there were three early minor AEs (mucosal injuries treated with clip placement only) and one minor delayed AE (delayed bleeding at the mucosotomy site with no intervention required).

Of the 35 patients who underwent GPOEM, 26 have follow up GCSI data. For clinical success, the mean pre-procedure total GCSI score was 2.78 (SD 0.93) and improved significantly post-procedure to 0.67 (0.73) at the most recent follow-up, a mean of 112 days (SD 30 days) after GPOEM, $p< 10\text{-}6$. Overall, 93.8% of patients had improvement in total GCSI following GPOEM; if the more stringent definitions of clinical success as described in (14) is applied (improvement in total GCSI≥1 AND ≥25% improvement in at least 2 subscales), 87.5% of patients had clinical success. Gastric emptying at 4 hours improved from 31.8% (SD 21.1%) at baseline to 77.9% (SD 25.8%) after GPOEM in the 16 patients in whom repeat gastric emptying was obtained after GPOEM.

Hospital admission data in the year before and following GPOEM were reviewed. In the year following GPOEM, there were fewer total hospital admissions and admissions related to gastroparesis (Table 2) across all patients compared to the preceding year. There was an observed decrease from 5.37 admissions/year (SD 4.47) to 3.60 admissions/year (SD 4.04) for all causes ($p< 10\text{-}6$)and from 3.60 admissions/year (SD 4.04) to 0.53 (SD 1.83) for gastroparesis-related admissions ($p< 10\text{-}6$).

Discussion

Gastroparesis is a common disorder after lung transplant that has an impact on quality of life, nutrition, and graft function. GPOEM is a recently described procedure for the treatment of pylorospasm and gastroparesis and has promising data in prospective trials, but its outcomes in a lung transplant population are still poorly understood.

This single center experience of 35 patients demonstrates the efficacy of GPOEM in reducing symptoms as measured by GCSI, improvement in gastric emptying, and a reduction in hospital admissions for all causes and gastroparesis-related admissions.

The observed rate of clinical success as defined in Mekaroonkamol et al. (14) of 87.5% was notably higher than prospective trials, with the caveat that this is a different patient population, and data were collected retrospectively.

A decrease in hospital admissions was also observed after GPOEM for all-cause admissions and those related to gastroparesis. Although the rate of admissions is likely expected to decrease as time elapses from the time of transplant, the natural history of gastroparesis typically does not follow this. Notably, the decrease in all-cause admissions is largely driven by a similar magnitude of decrease in gastroparesis-related admissions.

These outcomes are promising but must be cautiously interpreted given the limitations associated with the retrospective design of

the study, the small sample size, and the limited time to follow up. It is also important to note that GPOEM is effective in addressing pylorospasm, it likely does not affect gastric hypomotility, and thus there may be variability in outcomes between patients. Taken together with the existing body of literature, this single-center study suggests that GPOEM has a potential role in the management of gastroparesis in lung transplant patients. Prospective, multicenter clinical trials will be needed to better understand its effectiveness and to better identify those patients who would benefit most.

Table 1. Gastroparesis Cardinal Symptom Index outcomes for GPOEM in Lung Transplant Patients

	Post-Surgical (LTx)
GCSI Pre-GPOEM	2.78 (0.93)
GCSI Post-GPOEM	0.67 (0.73)
Percent patients with any improvement in total GCSI	93.80%
Percent patients with improvement in total GCSI ≥1	87.50%
Percent patients with improvement in total GCSI≥1 AND ≥25% improvement in at least 2 subscales (14)	87.50%

Table 2. Hospital admission rate before and after GPOEM in Lung Transplant Patients

	Post-Surgical (LTx)
All admissions	
12-month admission rate in year prior to GPOEM	5.37 (4.47)
12-month admission rate in year after GPOEM	2.42 (2.71)
p value	0.001
Gastroparesis-related admissions	
12-month admission rate in year prior to GPOEM	3.60 (4.04)
12-month admission rate in year after GPOEM	0.53 (1.83)
p value	<0.0000001

References

1. Camilleri M, Parkman HP, Shafi MA, et al. Clinical guideline: Management of gastroparesis. American Journal of Gastroenterology 2013;108:18-37.
2. D'Ovidio F, Singer LG, Hadjiliadis D, et al. Prevalence of gastroesophageal reflux in end-stage lung disease candidates for lung transplant. Ann Thorac Surg 2005;80:1254-60.
3. Hooft N, Smith M, Huang J, et al. Gastroparesis is common after lung transplantation and may be ameliorated by botulinum toxin-A injection of the pylorus. J Heart Lung Transplant 2014;33:1314-6.
4. Blackett JW, Benvenuto L, Leiva-Juarez MM, et al. Risk Factors and Outcomes for Gastroparesis After Lung Transplantation. Dig Dis Sci 2022;67:2385-94.
5. Mearin F, Camilleri M, Malagelada JR. Pyloric dysfunction in diabetics with recurrent nausea and vomiting. Gastroenterology 1986;90:1919-25.
6. Abell TL, Bernstein RK, Cutts T, et al. Treatment of gastroparesis: A multidisciplinary clinical review. Neurogastroenterology and Motility 2006;18:263-83.
7. Acosta A, Camilleri M. Prokinetics in gastroparesis. Gastroenterology Clinics of North America 2015;44:97-111.
8. Rao AS, Camilleri M. Review article: Metoclopramide and tardive dyskinesia. Alimentary Pharmacology and Therapeutics 2010;31:11-9.
9. Khashab MA, Stein E, Clarke JO, et al. Gastric peroral endoscopic myotomy for refractory gastroparesis: First human endoscopic pyloromyotomy (with video). Gastrointestinal Endoscopy 2013;78:764-8.
10. Ichkhanian Y, Vosoughi K, Aghaie Meybodi M, et al. Comprehensive Analysis of Adverse Events Associated with Gastric Peroral Endoscopic Myotomy: An International Multicenter Study. Surgical Endoscopy 2021;35:1755-64.
11. Vosoughi K, Ichkhanian Y, Benias P, et al. Gastric per-oral endoscopic myotomy (G-POEM) for refractory gastroparesis: results from an international prospective trial. Gut 2021.
12. Jacques J, Pagnon L, Hure F, et al. Peroral endoscopic pyloromyotomy is efficacious and safe for refractory gastroparesis: prospective trial with assessment of pyloric function. Endoscopy 2019;51:40-9.
13. Martinek J, Hustak R, Mares J, et al. Endoscopic pyloromyotomy for the treatment of severe and refractory gastroparesis: a pilot, randomised, sham-controlled trial. Gut 2022.
14. Mekaroonkamol P, Dacha S, Wang L, et al. Gastric Peroral Endoscopic Pyloromyotomy Reduces Symptoms, Increases Quality of Life, and Reduces Health Care Use For Patients With Gastroparesis. Clinical Gastroenterology and Hepatology 2019;17:82-9.

Session 13-3

Appropriate rescue therapy in recurrent lesions after colorectal EMR/ESD

Peter D. Siersema

Professor of Endoscopic Gastrointestinal Oncology
Editor-in-Chief, Endoscopy
Dept. of Gastroenterology and Hepatology
Radboud University Medical Center, Nijmegen, The Netherlands

Introduction

Endoscopic mucosal resection (EMR) or endoscopic submucosal dissection (ESD) of large lateral spreading or sessile colorectal polyps is associated with a recurrence rate of 15-20%. A wide variety of techniques are used to remove recurrent lesions (RLs). The efficacy and safety of endoscopic resection of these recurrences is not sufficiently clear.

Methods

A systematic review and meta-analysis was performed to identify studies reporting recurrence rates after treatment of colorectal RLs. Relevant publications were identified on MEDLINE and Embase. Studies in which RLs were treated with endoscopic resection were included. Rates of second recurrence (SRRs), technical success, complete endoscopic removal and adverse event were extracted.

Results

A total of 17 studies, reporting 5 different techniques for treating 854 recurrent lesions, were included in the meta-analysis. Cold snare resection/biopsy forceps techniques had the lowest SRR with 2.5% (95%CI 0.6; 9.3) for removing RLs ≤ 5mm in size. ESD and endoscopic full-thickness resection (eFTR) had SSRs of 2.8% (95% CI 1.2; 6.2) and 4.6% (95% CI 1.1; 16.6), respectively, for removing RLs with mean lesion sizes of 6.4 to 25.3mm. Finally, underwater EMR had a SRR of 17.1% (95% CI 8.8; 30.7) and re-EMR a SRR of 24.4% (95% CI 10.4; 47.4) for removing RLs between 7.8 and 16.9mm (Figure 1).

Conclusion

Studies on the treatment of recurrent colorectal lesions are limited due to the availability of mostly retrospective series. This meta-analysis found that cold snare resection/biopsy forceps had the lowest SRR (but for smaller lesions). ESD and eFTR were also associated with a lowest SRR (but for larger lesions). This study also suggests that EMR is not the preferred modality for removing larger RLs. Future (prospective) studies should take recurrent lesion size into account.

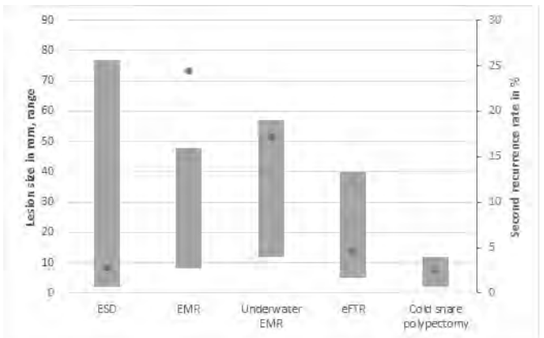


Figure 1.
Pooled second recurrence rates for each technique and their recurrent lesion size*
*Not all studies reported lesion size ranges.

Session 13-4

Hybrid surgery for gastrointestinal neoplasm (sentinel node navigation surgery)

Young Suk Park

Department of Surgery, Seoul National Univeristy Bundang Hospital, Seongnam-si, Korea

Gastrectomy with D1+/D2 lymphadenectomy is standard treatment for resectable advanced gastric cancer. However, in early gastric cancer without lymph node metastasis, gastrectomy with D1+/D2 lymphadenectomy may be unnecessary because the lymph node dissection could increase morbidity and reduce the quality of life (QOL). Therefore, the concept of sentinel lymph node emerged in gastric cancer surgery.

Although a number of feasibility studies for sentinel node (SN) concepts in gastric cancer have been conducted since 2000, there remains a debate regarding detailed detection techniques and oncological safety. Two important multicenter phase II clinical trials were performed in Japan that used different methods and reached different conclusions; one confirmed acceptable results with a false-negative rate of 7%, and the other showed an unacceptably high false-negative rate of 46.4%.

The Sentinel Node Oriented Tailored Approach (SENORITA) trial is a multicenter randomized controlled phase III trial being performed in Korea. Patient enrollment is now complete and the long-term results are currently awaited. Recently, an image-guided SN mapping technique using infrared ray/fluorescence was introduced. This method might be a promising technology because it allows the clear visualization of SNs.

Sentinel node navigation surgery may lead to actual organ-preserving surgery and play a key role in improving the quality of life of patients with early gastric cancer in the future. In this lecture, we summarize the current status and controversy of sentinel node navigation surgery in gastric cancer.

References

1. Kitagawa Y, Takeuchi H, Takagi Y, et al. Sentinel node mapping for gastric cancer: a prospective multicenter trial in Japan. J Clin Oncol 2013;31:3704- 10.
2. Miyashiro I, Hiratsuka M, Sasako M, et al. High false- negative proportion of intraoperative histological examination as a serious problem for clinical application of sentinel node biopsy for early gastric cancer: final results of the Japan Clinical Oncology Group multicenter trial JCOG0302. Gastric Cancer 2014;17:316-23.

Session 13-5

Embolization of post-ESD bleeding

Suyoung Park

Department of Radiology, Gil Medical Center, Gachon University College of Medicine, Incheon, Korea

Introduction

Endoscopic resection (ER), including endoscopic submucosal dissection (ESD), endoscopic mucosal resection (EMR) and endoscopic polypectomy (EP), are widely used for treatment of epithelial or subepithelial lesions with a low risk of local recurrence (1). They are considered to be safe, but several complications may occur, such as hemorrhage (2, 3). In particular, Transcatheter arterial embolization (TAE) is safe and effective in the treatment of immediate and delayed bleeding after ER, especially if the endoscopic hemostasis failed (4).

Vascular anatomy

The three major arteries that supply the gastrointestinal tract are the celiac trunk, the superior mesenteric artery (SMA), and the inferior mesenteric artery (IMA), although many variations are known. The arteries that supply blood to the rectum include IMA as well as the middle rectal artery and the inferior rectal artery, which are mainly branched from the ipsilateral internal iliac artery (IIA) or its branch. Therefore, when arterial bleeding in the rectum is suspected, it is important to obtain angiographic images of both IIAs as well as IMA (5).

Embolization techniques

For the procedure, international normalized ratio (INR) is recommended to be below 2.0-3.0 and platelet count to be above 20 x 109/L, otherwise there is a high risk of puncture site bleeding after the procedure (6). During the procedure, the femoral artery is mostly used as an arterial access route. After puncture of the artery, vascular sheath and an appropriate shaped diagnostic catheter is inserted to the suspected artery and the angiography is performed. Even if there is no evidence of active arterial bleeding, it is recommended to superselect the branches that supply the expected area of ER (e.g., middle colic artery for transverse colon) and perform the angiography. If the site is “clipped,” it can be used as a landmark. In particular, in the lower gastrointestinal tract, extensive empirical embolization can cause bowel ischemia more frequently than upper gastrointestinal tract, therefore it is useful to embolize fewer areas (7).

Once the bleeding focus is identified, selection of the culprit artery and embolization can be performed. It is recommended to superselect as distal as possible to prevent bowel ischemia especially in the lower gastrointestinal tract since the lower gastrointestinal tract has fewer collaterals than the upper gastrointestinal tract (8, 9). On the other hand, the upper gastrointestinal tract has more supplying arteries and forms anastomoses with each other, therefore even if one artery branch is embolized, persistent bleeding might occur due to collateral flow from other supplying arteries. If there is no evidence of active bleeding on the angiography after ER procedure on the gastroduodenal lesion, empirical embolization of the left gastric artery (10) and/or arteries corresponding to the location of the ER may be safe and effective (4).

Conclusions

TAE is safe and effective in the treatment of immediate and delayed bleeding after ER.

References

1. Kim SY, Kim KO. Management of gastric subepithelial tumors: The role of endoscopy. World J Gastrointest Endosc. 2016 Jun 10:418-24.
2. Fujishiro M. Endoscopic submucosal dissection for stomach neoplasms. World J Gastroenterol. 2006 Aug 28:5108-12.
3. Libanio D, Pimentel-Nunes P, Dinis-Ribeiro M. Complications of endoscopic resection techniques for upper GI tract lesions. Best Pract Res Clin Gastroenterol. 2016 Oct:735-48.
4. Park S, Jeong B, Shin JH, Jang EH, Hwang JH, Kim JH. Transarterial embolisation for gastroduodenal bleeding following endoscopic resection. Br J Radiol. 2021;94(1122):20210062.
5. Park S, Kim Y, Shin JH, Yang WJ, Noh SY, Chu HH, et al. Outcome of Rectal Arterial Embolization for Rectal Bleeding in 34 Patients: A Single-Center Retrospective Study over 20 Years. J Vasc Interv Radiol. 2020;31(4):576-83.
6. Patel IJ, Rahim S, Davidson JC, Hanks SE, Tam AL, Walker TG, et al. Society of Interventional Radiology Consensus Guidelines for the Periprocedural Management of Thrombotic and Bleeding Risk in Patients Undergoing Percutaneous Image-Guided Interventions-Part II: Recommendations: Endorsed by the Canadian Association for Interventional Radiology and the Cardiovascular and Interventional Radiological Society of Europe. J Vasc Interv Radiol. 2019;30(8):1168-84.e1.
7. Heianna J, Miyauchi T, Yamano H, Yoshikawa K, Hashimoto M, Murayama S. Management of angiogram-negative acute colonic hemorrhage: safety and efficacy of colonoscopy-guided superselective embolization. Tech Coloproctol. 2014;18(7):647-52.
8. Jae HJ, Chung JW, Kim HC, So YH, Lim HG, Lee W, et al. Experimental study on acute ischemic small bowel changes induced by superselective embolization of superior mesenteric artery branches with N-butyl cyanoacrylate. J Vasc Interv Radiol. 2008;19(5):755-63.
9. Ikoma A, Kawai N, Sato M, Sonomura T, Minamiguchi H, Nakai M, et al. Ischemic effects of transcatheter arterial embolization with N-butyl cyanoacrylate-lipiodol on the colon in a Swine model. Cardiovasc Intervent Radiol. 2010;33(5):1009-15.
10. Lang EV, Picus D, Marx MV, Hicks ME, Friedland GW. Massive upper gastrointestinal hemorrhage with normal findings on arteriography: value of prophylactic embolization of the left gastric artery. Am J Roentgenol. 1992;158(3):547-9.

Session 14-1

Advances in the endoscopic management of obesity

Christopher C. Thompson

Brigham and Women's Hospital, USA

Specialties

- Gastroenterology, Hepatology and Endoscopy

Clinical Interests

- Bariatric Endoscopy
- Biliary Disease
- Endoscopic Ultrasonography
- Gastroesophageal Reflux Disease (GERD)
- Interventional Endoscopy
- Metabolism
- Nutrition
- Obesity
- Pancreatic Disease
- Weight
- Weight Management
- Wellness

Education

Medical School
- Pennsylvania State University College of Medicine

Residency
- Milton S. Hershey Medical Center, 1996 - 1999

Fellowships
- Milton S. Hershey Medical Center, 1999 – 2002
- Massachusetts General and Brigham and Women's, 2002 – 2003

Session 14-2

Body composition imaging for sarcopenia evaluation

Dong Wook Kim

Department of Radiology and Research Institute of Radiology, University of Ulsan College of Medicine, Asan Medical Center, Seoul, Korea

Introduction

Sarcopenia, defined as a condition of low muscle mass and function, is deserved as a distinct disease entity which can lead to a decline in physical ability (1). Sarcopenia is not infrequent (29–33%) in community-dwelling populations and long-term care populations. Skeletal muscle plays pivotal roles not only in the mechanical function but in the neuroendocrine and metabolic functions. Therefore, sarcopenia can lead to physical disability, poor metabolism, and ultimately death (2). In addition, sarcopenia is associated with increased morbidity and mortality in patients with malignancies and other disease conditions (3).

Imaging Modalities for Sarcopenia

There are many methods to evaluate muscle mass, including anthropometry, bioelectrical impedance analysis (BIA), and medical imaging. Anthropometry assessments, such as body-mass index (BMI), skin-fold thickness, and body circumference (e.g., waist, thigh, and calf), are simple and readily available in any clinical setting, but may not be sufficiently accurate to evaluate muscle mass.

Medical imaging is considered an accurate and reliable method for quantifying muscle and fat mass and it discerns the spatial distribution of fat and muscle, enabling diagnosis and grading of sarcopenia, obesity, or both (i.e., sarcopenic obesity). The common imaging modalities for evaluating muscle mass include whole-body DXA, CT, and MRI.

1. Whole-body DXA

DXA measures the absorption of two X-ray photon energies, typically near 40–47 keV and 70–80 keV. The measurement of transmitted intensities at two photon energies enables the differentiation of bone, fat mass, and soft tissue lean mass (non-bone and non-fat soft tissue), based on different X-ray attenuation of tissues (4). DXA has advantage because of its low costs as compared to those of a CT scan, and is not limited by its operational complexity. Limitations of DXA include a lack of accuracy in estimating truncal fat and muscle, due to the presence of intra-abdominal solid organs and the bowel.

2. CT and MRI

CT has become the most widely used cross-sectional imaging modality, and is readily available worldwide. CT can accurately differentiate between fat and muscle tissue using the specific attenuation of each kind of tissue
(e.g., muscle, -29–150 Hounsfield units) and it provides very detailed anatomical information. In addition, CT enable to identify the degree of intramuscular fat given the inverse linear relationship between radiodensity and fat proportion, thus the assessment of muscle quality is also available (5).
MRI is also a good candidate for accurate measurement of body fat and muscle mass, by using differences in the radiofrequency pulse sequence between adipose tissue and fat-free mass. MRI has the advantage of no radiation exposure, making it more appropriate for

long-term follow-up. However, MRI is limited by its high cost and limited availability.

Conclusions

Importance of sarcopenia has been recognized in clinical practice and research. Currently, DXA and CT/MRI are most commonly used imaging modalities for sarcopenia assessment.

References

1. Santilli V, Bernetti A, Mangone M, Paoloni M. Clinical definition of sarcopenia. Clin Cases Miner Bone Metab. 2014;11:177-180.
2. Beaudart C, Zaaria M, Pasleau F, et al. Health Outcomes of Sarcopenia: A Systematic Review and Meta-Analysis. PLoS One. 2017;12:e0169548.
3. Martin L, Birdsell L, Macdonald N, et al. Cancer cachexia in the age of obesity: skeletal muscle depletion is a powerful prognostic factor, independent of body mass index. J Clin Oncol. 2013;31:1539-1547.
4. Bazzocchi A, Diano D, Ponti F, et al. A 360-degree overview of body composition in healthy people: relationships among anthropometry, ultrasonography, and dual-energy x-ray absorptiometry. Nutrition. 2014;30:696-701.
5. Ahn H, Kim DW, Ko Y, et al. Updated systematic review and meta-analysis on diagnostic issues and the prognostic impact of myosteatosis: A new paradigm beyond sarcopenia. Ageing Res Rev. 2021;70:101398.

Session 14-3

Bariatric and metabolic surgery in Asia

Sungsoo Park

Department of Surgery, Korea University College of Medicine, Seoul, Korea

Recently, more than 10 models have been developed to predict remission of type 2 diabetes mellitus (T2DM) after metabolic surgery.

Three East Asian countries Metabolic Surgery (TEAMS) was established as a clinical study group in 2016 to deepen the friendship of bariatric/metabolic surgeons in three East Asian countries, Korea, China, and Japan and to perform clinical research projects on bariatric/metabolic surgery. The first TEAMS symposium was held in Incheon, Korea, the second in Guangzhou, China, the third in Tokyo, Japan, and the fourth in Busan, Korea. In the third symposium, a collaborative project of comparison between the ABCD and IMS scoring systems for predicting long-term T2DM remission was proposed and approved on December 15, 2018. The final result was published in the journal of Obesity Surgery last year.

For the Asian populations for BMI, BMI in RYGB was much lower than those in SG and SG-DJB, and T2DM duration in SG-DJB was much longer than those in RYGB and SG.
The percentage of BMI < 35 kg/m2 in RYGB was significantly higher than those in SG and SGDJB. The RYGB group included many low BMI patients, and there were significantly large differences in BMI between RYGB and SG. %EWL was calculated based on BMI 25 kg/m2, and %EWL will be very large when a patient has a BMI close to 25 kg/m2 before the operation. Therefore, %EWL in
RYGB was significantly higher than that in SG, but %TWL in RYGB was significantly lower than that in SG. %EWL may not be adequate for comparison of weight loss between different BMI groups.

Many studies have shown gastric bypass to be superior to SG in terms of T2DM improvement. In addition, SG-DJB is also superior to SG in some previous reports and is comparable to gastric bypass. However, T2DM remission rates in RYGB were significantly inferior to those in SG-DJB in the moderate stages defined by the original and revised IMS scoring systems.

Preoperative BMI in RYGB was much lower than those in SG and SG-DJB. In addition, C-peptide levels in RYGB were significantly lower than those in SG, suggesting poor insulin secretion in RYGB patients. More than 60% of patients with severe T2DM based on ABCD score 2–0 have undergone RYGB, probably because it is considered the more effective procedure for T2DM remission.

Session 14-4

Bariatric embolization

Charles Y. Kim

Division of Interventional Radiology, Duke University Medical Center, Durham, NC, USA

Introduction

In 1997, the World Health Organization (WHO) designated obesity as a global epidemic, marking the first time in history that a non-infectious malady has been labeled as an epidemic. Over 1.4 billion adults are overweight, with a body mass index (BMI) of 25 or greater. 500 million are obese, with a BMI of 30 or more. Thus, 11% of the world's population was classified as obese. The rate of obesity is growing, with an incidence that has doubled since 1980. As obesity is ranked as the 5th leading risk for mortality globally, efforts must be aimed at minimizing this entity. While surgery has evolved into the most effective therapy when behavioral therapies (diet and exercise) have failed, numerous additional therapies are emerging as effective therapies that may convey less morbidity and mortality than surgery. As interventional radiology provides minimally invasive interventions, a variety of image-guided therapies have emerged as potential treatments for obesity.

Bariatric embolization

Bariatric embolization, also known as left gastric artery embolization, is a recently introduced endovascular image-guided procedure aimed at treating obesity. This procedure entails percutaneous trans-arterial particle embolization of the gastric fundus arterial supply, which is the site of the highest concentration of ghrelin-secreting cells in the body. By doing so, it is hypothesized that the intentionally induced ischemia in the gastric fundus will result in depressed serum ghrelin levels, which may decrease hunger, decrease food intake, and thereby induce weight loss. Animal studies have validated that embolization of the gastric fundus and body induces ischemia, which results in destruction of ghrelin-secreting cells, without early upregulation of these cells elsewhere in the stomach, resulting in net weight loss in treated animals compared to untreated animals (1,2). Several pilot studies in humans, which have showed an acceptable safety profile, with modest but relatively sustained levels of weight loss (3-7). As randomized trials have not yet been performed, this next step will be crucial for determining the potential role of this therapy in weight loss.

Conclusions

Given the critical need for safe and effective treatments of obesity, interventional radiology developments have been ongoing with promising results. However, randomized trials are needed to ascertain the potential benefit with this treatment, particularly in comparison to surgical interventions.

References

1. Paxton BE, Kim CY, Alley CL, et al. Bariatric embolization for suppression of the hunger hormone ghrelin in a porcine model. Radiology. 2013 Feb;266(2):471-9.
2. Paxton BE, Alley CL, Crow JH, et al. Histopathologic and immunohistochemical sequelae of bariatric embolization in a porcine model. J Vasc Interv Radiol. 2014 Mar;25(3):455-61.
3. Weiss CR, Abiola GO, Fischman AM, et al. Bariatric Embolization of Arteries for the Treatment of Obesity (BEAT Obesity) Trial: Results at 1 Year. Radiology. 2019 Jun;291(3):792-800.
4. Levigard RB, Serrão H, Castro C, et al. Bariatric Embolization in the Treatment of Patients with a Body Mass Index Between 30 and 39.9 kg/m2 (Obesity Class I and II) and Metabolic Syndrome, a Pilot Study. Cardiovasc Intervent Radiol. 2021 Apr;44(4):598-606.
5. Reddy VY, Neužil P, Musikantow D, Sramkova P, Rosen R, Kipshidze N, Kipshidze N, Fried M. Transcatheter Bariatric Embolotherapy for Weight Reduction in Obesity. J Am Coll Cardiol. 2020 Nov 17;76(20):2305-2317.
6. Bai ZB, Qin YL, Deng G, Zhao GF, Zhong BY, Teng GJ. Bariatric Embolization of the Left Gastric Arteries for the Treatment of Obesity: 9-Month Data in 5 Patients. Obes Surg. 2018 Apr;28(4):907-915.
7. Syed MI, Morar K, Shaikh A, Craig P, Khan O, Patel S, Khabiri H. Gastric Artery Embolization Trial for the Lessening of Appetite Nonsurgically (GET LEAN): Six-Month Preliminary Data. J Vasc Interv Radiol. 2016 Oct;27(10):1502-8.

Session 15-1

Endoscopic management for pancreatic duct stricture (with novel stent / metal stent)

Jae Hee Cho

Department of internal medicine, Gangnam Severance Hospital,
Yonsei University College of Medicine, Seoul, Korea

Introduction

Chronic pancreatitis is often accompanied by stricture of the main pancreatic duct (MPD), and treatment is required if it is associated with symptoms. Of them, persistent MPD stricture after initial plastic stent placement has been a challenge for endoscopists. Fully covered self-expandable metal stents (FC-SEMS) has been tried in patients with chronic pancreatitis (CP), however the efficacy and safety are still controversial. Thus, we aim to compare the long-term clinical efficacy of FC-SEMS vs. plastic stent placement in persistent MPD strictures secondary to CP

Methods

Between 2007 and 2018, 80 chronic pancreatitis patients (58 males, median age 49 years) underwent endoscopic placement of FC-SEMS (n=26) and plastic stent (n=54) for persistent MPD strictures. Procedure-related and clinical outcomes were retrospectively evaluated during a median follow-up duration of 33.7 months

Results

Technical success was achieved in all patients (100%). MPD stricture resolution was statistically higher in FC-SEMS group (87.0% vs. 42.0%, $p < 0.001$). Although immediate complications occurred similarly (38.5% vs. 37.0%, $p = 0.902$), spontaneous migration (26.9%) and de novo strictures (23.1%) were pronounced delayed complications in FC-SEMS group. Pain relapse during stent placement appeared to be less dominant (3.8% vs. 19.2%, $p = 0.066$), and pain relief during follow-up was significantly higher in FC-SEMS group (76.9% vs. 53.7%, $p = 0.046$). The total procedure cost was similar in both groups ($1,455.6 vs. $1,596.9, $p = 0.486$)

Conclusions

In comparison with plastic stent, FC-SEMS placement for persistent MPD strictures had favorable long-term clinical efficacy with higher MPD stricture resolution rate and sustained pain relief during follow-up, with its typical complications such as spontaneous migration and de novo strictures.

References

1. Lee SH, Kim YS, Kim EJ, Lee HS, Park JY, Park SW, Song SY, Cho JH, Bang S. Long-term outcomes of fully covered self-expandable metal stents versus plastic stents in chronic pancreatitis. Sci Rep 2021 Aug 2;11(1):15637

Table 1. Various types of FC-SEMS for persistent pancreatic duct strictures

Producer	Model	n, (%)
TaeWoong Medical	Niti-S®, D-type	10 (38.5%)
TaeWoong Medical	Niti-S®, Bumpy-type	4 (15.4%)
TaeWoong Medical	Niti-S®, ComVI-type	2 (7.7%)
M. I. Tech	Hanarostent®	5 (19.2%)
S&G BioTech	EGIS, FlowerTM stent	5 (19.2%)

Table 2. Comparison of clinical outcomes between FC-SEMS versus plastic stents for persistent pancreatic duct strictures

	FC-SEMS group (n=26)	Plastic stent group (n=54)	p-value
Clinical success	26 (100%)	52 (96.3%)	0.320
Pain relapse during stent placement	1 (3.8%)	10/52 (19.2%)	0.066
Pain relapse interval (months)	2.6	4.1 (95% CI 1.0 - 7.3)	0.384
Recurrence	6/22 (27.3%)	14/32 (43.8%)	0.587
Recurrence-free survival (months)	50.1 (95% CI 31.2- 69.1)	51.7 (95% CI 28.7 -74.7)	0.646
Pain relief during follow-up	20 (76.9%)	29 (53.7%)	0.0046

Session 15-2

Endoscopic ultrasound-guided pancreatic duct drainage

Hiroyuki Isayama

Department of Gastroenterology, Graduate School of Medicine, Juntendo University, Tokyo, Japan

Introduction

Endoscopic ultrasound/endosonography (EUS)-guided pancreatic duct drainage (EUS-PDD) is recognized as one of the most difficult procedures currently. Only expert can perform this procedure because of lack of dedicated devices. In this lecture, I will introduce devices and details of our procedure.

Indications

We perform EUS-PDD for the cases with any symptoms due to pancreatic stricture, but failed/difficult to approach to the pancreatic duct which should be drained. Followings are the possible indications of EUS-PDD: failed to access to the papilla, cannulate to the pancreatic duct or pass the stricture in the cases with pancreatic ductal stricture, difficult to access the papilla due to duodenal stenosis, pancreato-enteric anastomosis stricture in the cases with surgically altered anastomosis.

Procedures

We usually perform EUS-guided interventions with Convex type echoendoscope (EG-580UT and SU-1; Fujifilm, Tokyo, Japan). Puncture the pancreatic duct with 19G FNA needle (EG Shot 3; Olympus Medical systems, Tokyo, Japan). After injection of half contrast medium, 0.025 Visiglide (Olympus Medical systems, Tokyo, Japan) was inserted and placed as long as possible. If we can, passing the stricture of mein pancreatic duct and/or pancreatic-enteric anastomosis were effective for safety and good supportive method for the stent insertion. Initial puncture tract was dilated with boogie catheter with very thin tip (ES Dilator, Zeon medical devices inc., Kanagawa, Japan), or cautery dilator (Cyst-Gastro Set, Endoflex Gmbh, German). Additional GW was placed using double lumen catheter (Uneven catheter, PIOLAX Medical devices, Kanagawa, Japan) for stabilize the procedures and scope position. Second dilation was done with balloon catheter (REN, Kaneka Medicus, Osaka, Japan), and balloon diameter was selected according to the stent diameter. Stricture and papillary dilation were performed simultaneously. We think that minimum dilation of puncture tract may reduce the leakage both during the procedure and after placement of stent. Finally, plastic stent was placed. Double pigtail type stent with additional hall was selected in the cases with successfully passed the pancreatic-enteric anastomotic stricture and papilla. Stent placement for the case without passage the stricture or papilla, straight type plastic stent with flap was selected.

Additional procedures

After successful stent insertion and mature the anastomosis, we can insert some devices for additional procedure. Dilation of anastomosis was done with larger diameter stent or multiple plastic stent placement. Spyglass was effective to crush the stones with EHL or laser, after the dilation of anastomosis up to 10 Fr or two 7Fr stents. Confirmation of benign stricture was required in some cases. Spyglass was also effective in this indication. After confirmation of benign stricture, we keep the multiple stent more than 1 year to dilate the n¥benign stricture.

Tips of the procedure

Puncture of the pancreatic parenchyma of chronic pancreatitis cases was difficult because of severe fibrotic changes. EG Shot 3 was effective to puncture the most of chronic pancreatitis, but providing sharpener needle (SonoTip® Pro Control, Medi-Globe, Germeny) was warranted. High speed puncture penetrating the pancreatic duct was effective to be succeeded the puncture process. Distance between stomach and pancreas may be prolonged during the procedure. There was the following the risk of stent releasing in abdominal cavity. We recommend using the stent which fixed with delivery system and possible to pull out from the abdominal cavity.
Conclusion: EUS-PD was effective procedure by expert hand. The knowledge of the details of procedure and performing by/with expert was mandatory.

Conclusions

EUS-PDD was one of the most difficult endoscopic procedures for the management of pancreaticobiliary diseases. However, selecting the right operator and devices may improve the results of EUS-PDD. Additional procedures were also effective to resolve the patients status completely.

Session 15-3

Percutaneous radiologic intervention for pancreatic duct stricture

Kichang Han

Department of Radiology, Severance Hospital, Seoul, Korea

Chronic recurrent pancreatitis after pylorus-preserving pancreaticoduodenectomy (PPPD) surgery is a rare complication. If improperly managed, it can lead to necrotizing pancreatitis. Endoscopic plastic stent placement is an effective treatment option; however, the success rate is not high in patients with altered anatomy due to previous surgery, and surgical revision carries high operative risks. Percutaneous pancreatic duct stent placement is feasible in patients with previous surgery and can avoid complicated surgery.

Session 15-4

Surgical management of pancreatic duct stricture (esp. chronic pancreatitis)

Ho Kyoung Hwang

Department of HBP Surgery, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Introduction

Chronic pancreatitis is a disease in which the anatomical structure of the pancreas is altered and the endocrine and exocrine functions of the pancreas are gradually lost. Deformation of not only the pancreas but also surrounding tissues can cause various complications. In patients with chronic pancreatitis, surgery should be considered when pain is not controlled despite medical treatment or endoscopic treatment, or when chronic pancreatitis-related complications occur. Because of intractable pain, approximately 40-75% of patients eventually require surgery, and 34-95% of patients report that pain can be relieved after surgery (1). Although several randomized control studies (2, 3) so far have reported that surgery is more effective in pain control than conservative treatment or endoscopic treatment, the treatment of chronic pancreatitis is still performed in a step-by-step approach; Starting with conservative treatment, endoscopic treatment, and finally surgery.

Traditionally, the indications for surgery are as follows; 1) When pain cannot be controlled despite other medical treatments, 2) When complications caused by obstruction of the common bile duct or duodenum or pseudocysts, and 3) When a malignant tumor is suspected. The purpose of surgery is to solve intractable pain, improve the quality of life of patients, preserve the endocrine and exocrine functions of the pancreas if possible, and prevent further damage to the pancreas and surrounding tissues (4, 5).

Appropriate Time for Surgery

Treatment for chronic pancreatitis is usually a step-by-step procedure. Symptomatic therapy such as drug treatment, lifestyle changes such as abstinence and smoking cessation, and endoscopic approaches are first tried, and surgery is considered as the last step. This is due to concerns about the high complication rate and mortality of pancreatic surgery. According to a study by Van der Gagg Na et al. (6), surgery was performed after an average of 40 months after complaining of pain and after receiving an average of 2 endoscopic treatments. Although the decision on the timing of surgery in chronic pancreatitis will depend on the circumstances in which it is indicated, surgery was considered as the last treatment step for the purpose of pain relief. However, considering that ductal hypertension due to chronic inflammation-induced fibrosis, pancreatic duct stenosis, and pancreatic duct obstruction are the most representative factors as the mechanism causing pain, it is difficult to expect improvement with drug treatment in this situation. Recently, there is an increasing number of studies reporting good results in pain relief by performing early surgery, and there are reports that it is helpful in preserving the function of the remaining pancreas (7-9). Early surgery is defined as surgery as the first treatment at the time chronic pancreatitis was first diagnosed (2, 10, 11), and there are studies that defined early surgery as surgery performed within 3 years after symptom onset (9,12).

Effects of Early Surgery on Pain Control

Yang CJ (13) et al. reported that, through a systematic review, early surgery in chronic pancreatitis can provide successful pain relief, preserve pancreatic function, and reduce the frequency of repetitive procedures. Ahmed Ali (14) et al. analyzed a randomized controlled

trial that compared the effects of endoscopic treatment and surgery (2,3) and found that the effect of pain control according to the follow-up period after treatment was moderate (2-5 years), long-term (5 years) was better in all patients who underwent surgery. In addition, surgery was more effective in improving quality of life and exocrine function, and there was no difference in complications or mortality between the two groups. In a study analyzing the effect between surgery and conservative treatment (15), surgery was more effective in controlling pain than conservative treatment and in preserving pancreatic function. Therefore, early surgery before irreversible pancreatic changes in chronic pancreatitis patients is more advantageous than endoscopic or conservative treatment in terms of effective pain control and preservation of pancreatic function.

Effect of Early Surgery in Cancer Prevention

It has been well established that chronic pancreatitis is a risk factor for pancreatic cancer (16-18). Although the mechanism of the development of pancreatic cancer from pancreatitis has not yet been clearly elucidated, it is believed that activation of the Kras gene by chronic inflammation plays an important role in the development of pancreatic cancer from chronic pancreatitis (19-21). There is a report that when drainage is performed in an animal model that causes chronic pancreatitis by tying the main pancreatic duct, it is effective in preventing pancreatic ischemia and cancer by solving the compartment syndrome (22). In another experiment, it was reported that drainage performed in obstructive pancreatitis was effective in improving histological differentiation and exocrine function of the pancreas (8). In a retrospective, multicenter study in Japan (23), the group that underwent surgery had a significantly lower incidence of pancreatic cancer than the group that did not (hazard ratio, 0.11; 95% CI, 0.0014-0.80; p=0.03). Therefore, based on the results of previous studies, pancreatectomy or drainage in chronic pancreatitis showed good results in relieving pain, but it could also be said to be effective in preventing pancreatic cancer.

Effect of Early Surgery in terms of Preservation of Pancreatic Function and Repeated Procedure

Lamme Be et al. (8) reported that early surgery was better for histological recovery and exocrine function recovery through an animal experiment comparing the group that underwent pancreatico-jejunal drainage after the main pancreatic duct was blocked. In clinical studies, there are studies that it was possible to delay the loss of pancreatic function in patients with chronic pancreatitis through surgery (7,10,24). Considering the frequency of repeated endoscopic procedure, in a paper reporting a long-term (5 year) follow-up in a randomized control study, the frequency of repeated procedure was significantly higher in the case of endoscopic treatment as the first treatment compared to the patients who underwent surgery. (68% vs 5%), the complication rate was similar, but the length of hospital stay and the number of hospitalizations were lower in the group that underwent surgery (25). In addition, 47% of patients who underwent endoscopic treatment eventually had been performed surgery. In another study comparing surgery, endoscopic, and conservative treatment as the first treatment, the group that underwent surgery had the lowest frequency of repeated procedure (11).

Conclusions

Chronic pancreatitis is a progressive inflammatory disease that eventually causes irreversible changes in the pancreas, resulting in severe pain and limited socioeconomic activity, obstructive complications of peripheral organs, inflammatory mass formation in the pancreatic head, loss of endocrine/exocrine function, and increasing pancreatic cancer risk. In selecting the surgical method, the choice of whether to perform pancreatectomy or drainage operation depends on whether the main pancreatic duct is enlarged, the presence and location of an inflammatory mass, and common bile duct or duodenal obstruction, and the formation of pseudocysts.

If there is only dilatation of the main pancreatic duct, the best method is to perform the Partington-Rochelle procedure to allow sufficient drainage of the main pancreatic duct. In the presence of an inflammatory mass of the pancreatic head, it has been reported that the Frey procedure for pancreatic head resection and drainage has a lower complication rate and superior pain relief compared to other surgeries. Because there are many cases of socioeconomic difficulties due to chronic pain and many cases of dependence on painkillers or alcoholism, it is recommended that smoking cessation/abstinence from alcohol and psychological supportive therapy be implemented together to achieve the targeted treatment results with surgery. Since long-term follow-up is performed after surgery, it is important to carefully record whether pain recurs, endocrine/exocrine function worsens or improves during outpatient clinics, and it is recommended to check-up regularly considering the risk of cancer.

References

1. Issa Y, van Santvoort Hc Fau - van Goor H, van Goor H Fau - Cahen DL, et al. Surgical and endoscopic treatment of pain in chronic pancreatitis: a multidisciplinary update. Dig Surg. 2013;30:35-50.
2. Dite P, Ruzicka M Fau - Zboril V, Zboril V Fau - Novotny I, et al. A prospective, randomized trial comparing endoscopic and surgical therapy for chronic pancreatitis. Endoscopy. 2003;35:553-558.
3. Cahen DL, Gouma Dj Fau - Nio Y, Nio Y Fau - Rauws EAJ, et al. [Surgical drainage of the pancreatic duct in patients with chronic pancreatitis is more effective than endoscopic drainage: randomized trial]. Ned Tijdschr Geneeskd. 2007;151:2624-2630.
4. Beger HG, Schlosser W Fau - Friess HM, Friess Hm Fau - Buchler MW, et al. Duodenum-preserving head resection in chronic pancreatitis changes the natural course of the disease: a single-center 26-year experience. Ann Surg. 1999;230:512-519; discussion 519-523.
5. Bachmann K, Izbicki Jr Fau - Yekebas EF, Yekebas EF. Chronic pancreatitis: modern surgical management. Langenbecks Arch Surg. 2011;396:139-149.
6. van der Gaag NA, van Gulik Tm Fau - Busch ORC, Busch Or Fau - Sprangers MA, et al. Functional and medical outcomes after tailored surgery for pain due to chronic pancreatitis. Ann Surg. 2012;255(4):763-770.
7. Nealon WH, Thompson JC. Progressive loss of pancreatic function in chronic pancreatitis is delayed by main pancreatic duct decompression. A longitudinal prospective analysis of the modified puestow procedure. Ann Surg. 1993;217:458-468.
8. Lamme B, Boermeester Ma Fau - Straatsburg IH, Straatsburg Ih Fau - van Buijtenen JM, et al. Early versus late surgical drainage for obstructive pancreatitis in an experimental model. Br J Surg. 2007;94:849-854.
9. Ahmed Ali U, Nieuwenhuijs Vb Fau - van Eijck CH, van Eijck Ch Fau - Gooszen HG, et al. Clinical outcome in relation to timing of surgery in chronic pancreatitis: a nomogram to predict pain relief. Arch Surg. 2012;147:925-932.
10. Maartense S, Ledeboer M Fau - Bemelman WA, Bemelman Wa Fau - Ringers J, et al. Effect of surgery for chronic pancreatitis on pancreatic function: pancreatico-jejunostomy and duodenum-preserving resection of the head of the pancreas. Surgery. 2004;135:125-130.
11. Rutter K, Ferlitsch A Fau - Sautner T, Sautner T Fau - Puspok A, et al. Hospitalization, frequency of interventions, and quality of life after endoscopic, surgical, or conservative treatment in patients with chronic pancreatitis. World J Surg. 2010;34:2642-2647.
12. Riediger H, Adam U Fau - Fischer E, Fischer E Fau - Keck T, et al. Long-term outcome after resection for chronic pancreatitis in 224 patients. J Gastrointest Surg. 2007;11:949-959; discussion 959-960.
13. Yang CJ, Bliss La Fau - Schapira EF, Schapira Ef Fau - Freedman SD, et al. Systematic review of early surgery for chronic pancreatitis: impact on pain, pancreatic function, and re-intervention. J Gastrointest Surg. 2014;18:1863-1869.
14. Ahmed Ali U, Pahlplatz Jm Fau - Nealon WH, Nealon Wh Fau - van Goor H, et al. Endoscopic or surgical intervention for painful obstructive chronic pancreatitis. Cochrane Database Syst Rev. 2015;19.
15. Nealon WH, Thompson JC. Progressive loss of pancreatic function in chronic pancreatitis is delayed by main pancreatic duct decompression. A longitudinal prospective analysis of the modified puestow procedure. Ann Surg. 1993;217:458-466.
16. Lowenfels AB, Maisonneuve P Fau - Cavallini G, Cavallini G Fau - Ammann RW, et al. Pancreatitis and the risk of pancreatic cancer. International Pancreatitis Study Group. N Engl J Med. 1993;328(20):1433-1437.
17. Bansal P, Sonnenberg A. Pancreatitis is a risk factor for pancreatic cancer. Gastroenterology. 1995;109(1):247-251.
18. Malka D, Hammel P Fau - Maire F, Maire F Fau - Rufat P, et al. Risk of pancreatic adenocarcinoma in chronic pancreatitis. Gut. 2002;51:849-852.
19. Ji B, Tsou L Fau - Wang H, Wang H Fau - Gaiser S, et al. Ras activity levels control the development of pancreatic diseases. Gastroenterology. 2009;137:1072-1082, 1082 e1071-1076.
20. Guerra C, Schuhmacher Aj Fau - Canamero M, Canamero M Fau - Grippo PJ, et al. Chronic pancreatitis is essential for induction of pancreatic ductal adenocarcinoma by K-Ras oncogenes in adult mice. Cancer Cell. 2007;11(3):291-302.

21. Guerra C, Collado M Fau - Navas C, Navas C Fau - Schuhmacher AJ, et al. Pancreatitis-induced inflammation contributes to pancreatic cancer by inhibiting oncogene-induced senescence. Cancer Cell. 2011;19:728-739.
22. Karanjia ND, Widdison Al Fau - Leung F, Leung F Fau - Alvarez C, et al. Compartment syndrome in experimental chronic obstructive pancreatitis: effect of decompressing the main pancreatic duct. Br J Surg. 1994;81:259-264.
23. Ueda J, Tanaka M Fau - Ohtsuka T, Ohtsuka T Fau - Tokunaga S, et al. Surgery for chronic pancreatitis decreases the risk for pancreatic cancer: a multicenter retrospective analysis. Surgery. 2013;153:357-364.
24. Nealon WH, Townsend Cm Jr Fau - Thompson JC, Thompson JC. Operative drainage of the pancreatic duct delays functional impairment in patients with chronic pancreatitis. A prospective analysis. Ann Surg. 1988;208:321-329.
25. Cahen DL, Gouma Dj Fau - Laramee P, Laramee P Fau - Nio Y, et al. Long-term outcomes of endoscopic vs surgical drainage of the pancreatic duct in patients with chronic pancreatitis. Gastroenterology. 2011;141:1690-1695.

Session 16-1

Pathopysiology of short bowel syndrome

Alan Li

Upper Gastro-Intestinal (Oesophago-Gastric) Surgery,
Salford Royal Hospital and Manchester Royal Infirmary, Manchester, UK

Introduction

Short bowel syndrome (SBS) is a constellation of symptoms including diarrhea, dehydration, electrolyte disturbance and malnutrition (1,2). It is distinct but often used synonymously with intestinal failure (IF) which requires supplementary parenteral nutrition (PN) to maintain hydration and nutrition (3). SBS is a spectrum disorder and its severity is contingent upon the resected or diseased length of bowel, persistent active disease, and the length and functional capacity of the remnant gastro-intestinal (GI) tract (4). The acute phase of SBS is characterized by a dependence on PN whilst the chronic phase is one of expectant adaptation of the GI tract with a weaning off from PN (5,6).

The causes of SBS in adults include surgical resection; vascular, inflammatory and malignant disease (and its treatment); trauma and GI dysfunction. At an estimated incidence of 2 patients / million / year, SBS is not common but the physical, emotional and economic impacts are universally devastating (7). However, this figure is now likely to be an underestimate given the emergence of the consequences of deliberate alterations in GI anatomy associated with bariatric malabsorptive procedures e.g. gastric bypass, duodenal switch, BP diversion, SADI-S (8).

Normal Intestinal Physiology

There is much evidence to support a proximal to distal nutrient absorptive gradient with digestion occurring more proximally in the stomach and proximal small intestine and absorption both in the proximal and distal small intestine and colon (9). The regulation of intestinal transit is important in digestion and absorption functions and is governed by humoral and neural mediators which also optimize conditions in favour of nutrient processing through the regulation of digestive enzymes, providing pH and other suitable environments, gastric and intestinal motility, and intestinal growth (10,11).

General losses negatively impact upon fluid, electrolyte, protein, carbohydrate, fat and micronutrient absorption. Of 8-9 litres/day of fluid, 80% and 18% is absorbed by the SI and colon, respectively, and this will be reduced in addition to an overall calorie deficit (2). There are also site-specific elements to consider including iron and folate (duodenum and jejunum), lactose (jejunum and proximal ileum), B12 and bile salts (distal ileum) (12,13,14).

Normal Intestinal Physiology

There is much evidence to support a proximal to distal nutrient absorptive gradient with digestion occurring more proximally in the stomach and proximal small intestine and absorption both in the proximal and distal small intestine and colon (9). The regulation of intestinal transit is important in digestion and absorption functions and is governed by humoral and neural mediators which also optimize conditions in favour of nutrient processing through the regulation of digestive enzymes, providing pH and other suitable environments, gastric and intestinal motility, and intestinal growth (10,11).

General losses negatively impact upon fluid, electrolyte, protein, carbohydrate, fat and micronutrient absorption. Of 8-9 litres/day of fluid, 80% and 18% is absorbed by the SI and colon, respectively, and this will be reduced in addition to an overall calorie deficit (2). There are

also site-specific elements to consider including iron and folate (duodenum and jejunum), lactose (jejunum and proximal ileum), B12 and bile salts (distal ileum) (12,13,14).

Pathophysiology of Short Bowel Syndrome

Often the extent and site of a surgical resection is governed by the primary pathology, and occasionally by necessary considerations towards GI vascularity and the integrity of an anastomosis or stoma. The subsequent effects depend on resected segment (site and length) and the functional and adaptive capacity of the remnant bowel (15,16).

More proximal resections (jejunal) are better tolerated as the remnant ileum and colon may compensate for fluid and calorie absorption. The colon may increase its fluid absorption from <2l/day to 5l/day and can significantly contribute to carbohydrate scavenging (17,18). There are relatively few site-specific losses as the duodenum, proximal jejunum and ileum are preserved.

Loss of the functioning ileum (+/- part of the jejunum) has greater consequences due to the reduced adaptive capacity of the more proximal jejunum. Decreased water reabsorption places strain on the colon and there are site-specific losses to include vitamin B12, bile salts and consequently fats and fat-soluble vitamins, all of which contribute to intractable diarrhoea. A remnant combined small intestine length of less than 60-65cm is nearly always dependent on PN (19,20,21).

Patients that ultimately lose both the ileum and colon (+/- part of jejunum) are at the greatest peril of long term PN dependence, particularly in those with less than 100cm of residual bowel. They lose water resorption capacity, any energy-salvage benefits in scavenging carbohydrate absorption from the colon, and also site-specific losses of the ileum. These patients are in effect “net secretors” of fluid, energy and nutrients (22,23,24).

The extra-intestinal deleterious effects of SBS include hepatic and biliary disease; metabolic bone deficiencies; neural, cardiac, musculoskeletal and immune deficits; bacterial overgrowth and renal and gallbladder calculi (25,26).

Conclusion

In the face of short bowel syndrome, thought must be given not only to the remnant length but also the functional absorptive and adaptive capacity of the bowel in terms of more general losses and site-specific deficits that are likely to occur. The clinical management of patients with SBS must be individualized and as a consequence, is demanding on resources with specialist units often having relatively few patients but needing the greatest input from the wider multi-disciplinary team.

References

1. Vanderhoof JA, Langnas AN. Short-bowel syndrome in children and adults. Gastroenterology. 1997; 113: 1767– 1778.
2. Hollwarth ME. Short bowel syndrome: pathophysiological and clinical aspects. Pathophysiology. 1999; 6: 1– 19.
3. Nightingale J, Woodward JM; Small Bowel Nutrition Committee of the British Society of Gastroenterology. Guidelines for management of patients with a short bowel. Gut. 2006; 55(suppl 4): iv1– 12.
4. Jeppesen PB. Spectrum of short bowel syndrome in adults: intestinal insufficiency to intestinal failure. JPEN J Parenter Enteral Nutr. 2014; 38(suppl 1): 8S– 13S.
5. Cisler JJ, Buchman AL. Intestinal adaptation in short bowel syndrome. J Investig Med. 2005; 53: 402– 413.
6. Tappenden KA. Intestinal adaptation following resection. JPEN J Parenter Enteral Nutr. 2014; 38(suppl 1): 23S– 31S.
7. Buchman AL. Etiology and initial management of short bowel syndrome. Gastroenterology. 2006; 130: S5– S15.
8. Lange J, A. Malnutrition as a Complication of Bariatric Surgery – A Clear and Present Danger? Visc Med. 2019 Oct; 35(5): 305–311.
9. Tappenden KA. Mechanisms of enteral nutrient-enhanced intestinal adaptation. Gastroenterology. 2006; 130: S93– 99.
10. Nightingale JM, Kamm MA, van der Sijp JR, Ghatei MA, Bloom SR, Lennard-Jones JE. Gastrointestinal hormones in short bowel syndrome. Peptide YY may be the ‘colonic brake’ to gastric emptying. Gut. 1996; 39: 267– 272.
11. Chu S, Schubert ML. Gastric secretion. Curr Opin Gastroenterol. 2012; 28: 587– 593.
12. Fuqua BK, Vulpe CD, Anderson GJ. Intestinal iron absorption. J Trace Elem Med Biol. 2012; 26: 115– 119.
13. Qiu A, Jansen M, Sakaris A, et al. Identification of an intestinal folate transporter and the molecular basis for hereditary folate malabsorption. Cell. 2006; 127: 917– 928.
14. Torp N, Rossi M, Troelsen JT, Olsen J, Danielsen EM. Lactase-phlorizin hydrolase and aminopeptidase N are differentially regulated in the small intestine of the pig. Biochem J. 1993; 295(pt 1): 177– 182.
15. Nightingale JMD. The short bowel. In: JMD Nightingale, ed. Intestinal Failure. London, UK: Greenwich Medical Media; 2001: 177– 198.
16. O'Keefe SJ, Buchman AL, Fishbein TM, Jeejeebhoy KN, Jeppesen PB, Shaffer J. Short bowel syndrome and intestinal failure: consensus definitions and overview. Clin Gastroenterol Hepatol. 2006; 4: 6– 10.
17. Nordgaard I, Hansen BS, Mortensen PB. Importance of colonic support for energy absorption as small-bowel failure proceeds. Am J Clin Nutr. 1996; 64: 222– 231.
18. Debongnie JC, Phillips SF. Capacity of the human colon to absorb fluid. Gastroenterology. 1978; 74: 698– 703.
19. Sundaram A, Koutkia P, Apovian CM. Nutritional management of short bowel syndrome in adults. J Clin Gastroenterol. 2002; 34: 207– 220.
20. Carbonnel F, Cosnes J, Chevret S, et al. The role of anatomic factors in nutritional autonomy after extensive small bowel resection. JPEN J Parenter Enteral Nutr. 1996; 20: 275– 280.
21. Eusufzai S. Bile acid malabsorption: mechanisms and treatment. Dig Dis. 1995; 13: 312– 321.
22. Matarese LE. Nutrition and fluid optimization for patients with short bowel syndrome. JPEN J Parenter Enteral Nutr. 2013; 37: 161– 170.
23. Nightingale JM, Lennard-Jones JE, Walker ER, Farthing MJ. Jejunal efflux in short bowel syndrome. Lancet. 1990; 336: 765– 768.
24. Thompson JS, Rochling FA, Weseman RA, Mercer DF. Current management of short bowel syndrome. Curr Probl Surg. 2012; 49: 52– 115.
25. Hill GL, Mair WS, Goligher JC. Gallstones after ileostomy and ileal resection. Gut. 1975; 16: 932– 936.
26. Nightingale JM. Hepatobiliary, renal and bone complications of intestinal failure. Best Pract Res Clin Gastroenterol. 2003; 17: 907– 929.

Session 16-2

CT- and MR-enterography for post-op. evaluation

So Hyun Park

Gil Medical Center, Gachon University College of Medicine, Korea

Short Bowel Syndrome

Short bowel syndrome affects patients who have had large portions of their small intestine surgically removed as a result of a digestive illness, such as Crohn's disease. Short bowel syndrome is diagnosed clinically when patients are unable to maintain protein-energy, fluid, electrolyte, or micronutrient balance, generally in the setting of a total small intestinal length of less than 150 cm to 200 cm [1]. The major cause of short bowel syndrome for patients with Crohn's disease is the surgical removal of large amounts of the small intestine [1,2].

Bowel length measurement on CTE and MRE to predict short bowel syndrome

Small-bowel length measurements on CTE and MRE are accurate compared with anatomic measurements. They can provide an effective noninvasive investigation in planning surgical and nutritional intervention in patients with compromised bowel length [3].

CT and MR enterography

Cross-sectional imaging, such as CT and MR enterography (MRE), has also been shown to predict postoperative recurrence in Crohn's Disease (CD). These noninvasive methods can both predict postoperative recurrence and provide additional information alongside endoscopy, especially with regard to stricturing behavior and evaluation of areas that are not visualized on endoscopy [4].

Postoperative Recurrence

Patients with anastomotic lesions had poorer clinical long-term outcomes than those without any lesions at the anastomosis or neo-terminal ileum [4]. CT enterography (CTE) can help differentiate between disease recurrence and fibrostenosis at the anastomotic site after ileocolic resection for CD. The two most discriminating variables they discovered in the differentiation between anastomotic recurrence and fibrostenosis was the comb sign and stratification. MRE may also help differentiate between disease recurrence and fibrostenosis at the anastomotic site whether diffusion restriction is shown or not. One definite advantage of CTE and MRE is ability to evaluate endoscopically inaccessible areas, particularly the detection of penetrating complications. A study reported that CTE may be a viable option for the early surveillance of recurred CD, including for the evaluation of clinically silent patients, within 12 months of bowel surgery [5].

Conclusion

CTE and MRE can help to measure remnant bowel length for patients with CD who underwent bowel resection surgery and are suspicious short bowel syndrome and to detect postoperative recurrence at the anastomotic site.

References

1. Fuglestad MA, Thompson JS. Inflammatory Bowel Disease and Short Bowel Syndrome. Surg Clin North Am. 2019;99(6): 1209-1221. doi: 10.1016/j.suc.2019.08.010.
2. Thompson JS, Iyer KR, DiBaise JK, Young RL, Brown CR, Langnas AN. Short bowel syndrome and Crohn's disease. J Gastrointest Surg. 2003;7(8): 1069-1072. doi: 10.1016/j.gassur.2003.08.007.
3. Sinha R, Trivedi D, Murphy PD, Fallis S. Small-intestinal length measurement on MR enterography: comparison with in vivo surgical measurement. AJR Am J Roentgenol. 2014;203(3): W274-279. doi: 10.2214/ajr.13.11944.
4. Dasharathy SS, Limketkai BN, Sauk JS. What's New in the Postoperative Management of Crohn's Disease? Dig Dis Sci. 2022;67(8): 3508-3517. doi: 10.1007/s10620-021-07205-w.
5. Choi IY, Park SH, Park SH, Yu CS, Yoon YS, Lee JL, et al. CT Enterography for Surveillance of Anastomotic Recurrence within 12 Months of Bowel Resection in Patients with Crohn's Disease: An Observational Study Using an 8-Year Registry. Korean J Radiol. 2017;18(6): 906-914.

Session 16-3

Surgical approach for intestinal failure –When? to whom?

Dayoung Ko

Department of Pediatric Surgery, Seoul National University Hospital, Seoul, Korea

Introduction

Short bowel syndrome and motility disorders are the most common cause of chronic intestinal failure in children. They need to supply total parenteral nutrition at home for proper neurodevelopment. In addition, pharmacologic and surgical treatments are crucial approach for intestinal failure children.

Intestinal failure in Pediatrics

1. **Pathophysiology and cause**
   - Common etiologies for pediatric intestinal failure
     - Short bowel syndrome: Necrotizing enterocolitis, gastroschisis, intestinal atresia, midgut volvulus
     - Dysmotility disorders: Hirschsprung disease, Chronic intestinal pseudoobstruction
     - Congenital disease: microvillous atrophy

Management of intestinal failure : Intestinal Rehabilitation

1. **Multi-disciplinary approach is important**
   A. Pharmacologic approach
      i. Antimotility agent, prokinetics, UDCA, octerotide, antimicrobial agent
      ii. Growth hormone
      iii. Other emerging therapies
   B. Nutritional approach
      i. Parenteral nutrition
      ii. Management of PN associated liver disease
      iii. Enteral nutrition
   C. Surgical approach
2. **Surgical approach for IF children**
   A. In addition to medical and pharmacologic treatments for IF, some patients may require surgical management. Surgical indications for IF can be divided into 2 categories
   B. Procedure for correcting the etiology of IF
   C. Procedure for addressing the numerous complication from IF
      i. Lengthening procedure
         Longitudinal intestinal lengthening and tailoring (LILT)
         Serial Transverse Enteroplasty (STEP)
      ii. Transplantatioin

Session 16-4

Nutritional support in short bowel syndrome

Seong-Eun Kim

Departmen of Internal Medicine, Ewha Womans University College of Medicine, Seoul, Korea

Short bowel syndrome (SBS) is a complicated diseased state due to the physical or the functional loss of a portion of the small and/or large intestine. Patients with SBS often have a reduced ability to absorb macronutrients such as fats and carbohydrates, as well as micronutrients including vitamins and trace elements and fluids, having malabsorption disease consequently.

Along with the common symptoms and signs of severe diarrhea, steatorrhea, and dehydration, the patients can show the following symptoms and signs of malnutrition and electrolyte disturbances; deficiencies of zinc, iron, or vitamin B12, fat-soluble vitamin deficiency; malabsorption of carbohydrates, lactose, and protein; deficiencies of calcium and magnesium, and metabolic acidosis. Moreover, the complications with gastric acid hypersecretion, formation of cholesterol biliary calculi and renal oxalate calculi can be possible. In particular, the absence of ileum puts patients at risk for deficiencies for vitamin B12, calcium, magnesium, zinc, fat-soluble vitamins, and bile acid malabsorption. Resection of the ileocecal valve can predispose to small intestinal bacterial overgrowth. Meanwhile, preservation of the colon can significantly reduce water and electrolyte losses.

Strict and thorough nutritional management is the key factor for a good outcome in SBS. Nutritional therapy in SBS has traditionally been divided into three phases: an acute phase, adaptation phase, and a maintenance phase. In the acute phase after extensive bowel resection, appropriate intravenous supplementation (total parenteral nutrition) should be initiated to meet energy and protein requirements, with micronutrient supplementation. Since it is a time when excessive fluid and electrolyte loss occurs, a sufficient supply with intensive monitoring of fluid and electrolytes (including calcium and magnesium) is also important. Usually, the need for long-term total parenteral nutrition varies depending on the remaining functional bowel length. Patients with a short remaining (< 100 cm of remaining jejunum) and those with excessive fluid and electrolyte losses may require TPN for life.

If the patient stabilizes and stool output is < 2 L/day, an oral iso-osmotic solution of sodium and glucose (like the WHO's oral rehydration formula) can be slowly introduced. After adaptation, fat and protein in the diet are usually well tolerated, however, carbohydrates would give a significant osmotic load. So, small frequent feedings (at least 5 meals) should be tried to reduce the osmotic load. Patients with end-jejunostomy can benefit from a high-lipid diet (40% of calories) and oral rehydration solutions. On the other hand, for patients with colon in continuity, a high carbohydrate and low-fat diet is recommended, as well as a low-oxalate diet to avoid oxaluria and nephrolithiasis. Sometimes, high-protein and high-calorie diet are recommended to compensate malabsorption.

Other recent advances in the medical management of SBS include pharmacologic treatments (such as teduglutide (a glucagon-like peptide-2 [GLP-2] analog) to stimulate intestinal absorption and adaptation, in addition to conventional medical management such as antidiarrheals, cholestyramine, proton pump inhibitors, and vitamin supplements. Since these new therapeutic tries with a technical development of small-bowel transplantation would completely modifies the natural course of SBS in the near future, it is hopefully predicted that patients' care including nutrition support also would be adjusted accordingly.

References

1. de Dreuille B, Joly F. Disease-modifying therapies in short bowel syndrome. Curr Opin Pharmacol. 2022;65:102240.

2. Izzo K, Feczko S, Park JS. Use of oral rehydration solution and intravenous fluid in home settings for adults with short bowel syndrome. Nutr Clin Pract. 2022 Jul 3.
3. Sundaram A, Koutkia P, Apovian CM.Nutritional management of short bowel syndrome in adults. J Clin Gastroenterol. 2002;34(3):207-20.
4. Cuerda C, Pironi L, Arends J, et al. ESPEN practical guideline: Clinical nutrition in chronic intestinal failure. Clin Nutr. 2021;40(9):5196-5220.
5. Bering J, DiBaise JK. Short Bowel Syndrome in Adults. Am J Gastroenterol. 2022;117(6):876-883
6. Billiauws L, Thomas M, Le Beyec-Le Bihan J, et al. Intestinal adaptation in short bowel syndrome. What is new? Nutr Hosp. 2018;35(3):731-737.
7. Jeppesen PB, Gabe SM, Seidner DL, et al. Factors Associated With Response to Teduglutide in Patients With Short-Bowel Syndrome and Intestinal Failure. Gastroenterology. 2018;154(4):874-885.

Session 17-1

Case presentation

Tae Jun Kim

Department of Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

A 43-years old male patient was diagnosed with gastric cancer and was admitted to the hospital. On esophagogastroduodenoscopy, about 2cm slightly elevated lesion was seen on the great curvature side of low body. Converging folds was observed around the lesion and the appearance of folds was accompanied by clubbing and fusion. The biopsy result confirmed poorly differentiated adenocarcinoma. Considering the depth of invasion of endoscopic gross morphology, the tumor seemed to invade into submucosal layer at least. On the CT scan, there was about 2cm enhanced wall thickening lesion on the great curvature side, and there was no evidence of lymph node metastasis or distant metastasis.

The patient underwent surgery for gastric cancer. Laparoscopic radical subtotal gastrectomy with Billroth II anastomosis and lymph node dissection. The patient started diet on the post-operative day 3 and was discharged without any complications on the post-operative day 7. The final pathology result revealed 1.5cm advanced gastric cancer, which was poorly differentiated adenocarcinoma that invaded muscularis propria without lymph node metastasis. After curative resection, the patient was scheduled for follow-up on outpatient clinic.

On the 11th day after discharge, the patient developed hematochezia and was admitted to the emergency department. Vital signs revealed a blood pressure of 112/79 mmHg, pulse rate of 102 per minute, and temperature of 37.3°C. The abdomen of the patient was soft and flat, with normoactive bowel sound. Digital rectal examination revealed a black, tarry stool. The initial laboratory results showed that hemoglobin was decreased to 8.0 g/dL. The CT angiography scan revealed no active bleeding in remnant stomach and anastomosis site. On the 2nd day of hospitalization, endoscopy showed no bleeding focus on the anastomosis site and remnant stomach. On the 4th day of hospitalization, the patient developed recurrent hematemesis. Vital signs revealed a blood pressure of 130/75 mmHg, pulse rate of 122 per minute, and temperature of 36.5°C. The hemoglobin was severely decreased to 6.6 g/dL. The patient was transferred the intensive care unit, and planned to undergo intubation and therapeutic endoscopy. The endoscopy showed spurting bleeding on the suture line of remnant stomach lesser curvature side. Endoscopic treatment with electrocauterization using coagrasper was performed on the bleeding vessel. Complete hemostasis was achieved through the endoscopic therapy. The patient's vital sign became stable and hemoglobin level was increased to 8.1 g/dL after transfusion. However, on the 6th day of hospitalization, the patient developed recurrent hematemesis. Vital signs showed a blood pressure of 94/43 mmHg and pulse rate of 137 per minute. Emergent endoscopy showed large hematoma in the remnant stomach and active bleeding on the previous bleeding lesion. Endoscopic treatment with electrocauterization using coagrasper and mechanical hemostasis using hemoclip was performed but failed to hemostasis. During endoscopy, blood pressure was further decreased to 60/40 mmHg. Despite fluid resuscitation and massive transfusion, the patient's vital sign was unstable, therefore laparotomy was eventually planned. There was massive bleeding from a branch of common hepatic artery and total gastrectomy was performed after hemostasis. After surgery, the patient's condition improved, and he was discharged without further complication. He is being followed up at outpatient clinic.

Session 17-2

Endoscopic management of gastric cancer bleeding

Moon Won Lee

Department of Internal Medicine and Gastroenterology Division,
Pusan National University Hospital, Pusan, Korea

Introduction

Tumor bleeding accounts for up to 5% of upper gastrointestinal bleeding (UGIB) cases. Endoscopy is important for the diagnosis and primary treat¬ment of UGIB, and guidelines recommended endoscopy with¬in 24 hours of presentation. Endoscopy is also important for the management of tumor bleeding. However, published data on the role of endoscopic therapy (ET) in bleeding due to upper GI tract neoplasia are limited, and evidence supporting a specific modality is scarce.

First Main Body

For the treatment of UGIB, ET is generally recommended as the first-line treatment. The rate of successful endoscopic hemostasis is in patients with tumor bleeding due to gastric cancer was between 31% and 100%. However, rebleeding rates in patients that under¬went ET for gastric cancer bleeding were higher (ranging from 41% to 80%) than those for patients with peptic ulcer bleeding (ranging from 8% to 24%).

The ET modalities that can be used for hemostasis are injec¬tion therapy, mechanical therapy, ablative therapy, and a com¬bination of several modalities. However, these methods are difficult to achieve hemostasis because of tumor bed characteristics such as marked fi¬brosis, hardness of the adjacent mucosa, friability of cancer mucosa, and hypervascularity of the tumor. Among ET, thermal therapy, such as with hemostatic forceps or APC, was used most often to achieve initial hemostasis (79–93%), while hemoclipping was performed in only 5–25% of patients. Combined hemostatic methods were required in 34–44% of patients. Recent studies have shown the utility of a topical spray using hemostatic agents for managing UGIB. When applied to a bleeding site, hemostatic powder rapidly absorb water from the blood, causing a high concentration of platelets, red blood cells, and coagulation proteins that accelerates the physiologic clotting cascade.

Conclusions

Endoscopic hemostasis for tumor bleeding is not significantly different from UGIB treatment but has a low success rate and a high rebleeding rate. New hemostatic methods such as hemostatic powder may be an alternative, but more follow-up studies are needed.

References

1. Song, In Ji, et al. “Clinical outcomes of endoscopic hemostasis for bleeding in patients with unresectable advanced gastric cancer.” Journal of Gastric Cancer 17.4 (2017): 374-383.
2. Shin, Jongbeom, et al. “Efficacy of a novel hemostatic adhesive powder in patients with upper gastrointestinal tumor bleeding.” BMC gastroenterology 21.1 (2021): 1-8.
3. Kim, Young-Il, and Il Ju Choi. “Endoscopic management of tumor bleeding from inoperable gastric cancer.” Clinical Endoscopy 48.2 (2015): 121-127.
4. Kim, Yeong Jin, et al. “Hemostatic powder application for control of acute upper gastrointestinal bleeding in patients with gastric malignancy.” Endoscopy international open 6.06 (2018): E700-E705.
5. Kawabata, Hideaki, Misuzu Hitomi, and Shigehiro Motoi. “Management of bleeding from unresectable gastric cancer.” Biomedicines 7.3 (2019): 54.
6. Kim, Young□Il, et al. “Outcome of endoscopic therapy for cancer bleeding in patients with unresectable gastric cancer.” Journal of gastroenterology and hepatology 28.9 (2013): 1489-1495.
7. Koh, Kang Hun, et al. “The successful endoscopic hemostasis factors in bleeding from advanced gastric cancer.” Gastric Cancer 16.3 (2013): 397-403.
8. Hussein, Mohamed, et al. “Hemostatic powder TC□325 treatment of malignancy□related upper gastrointestinal bleeds: International registry outcomes.” Journal of Gastroenterology and Hepatology 36.11 (2021): 3027-3032.

Session 17-3

Embolization of gastric cancer bleeding

Jiaywei Tsauo

Department of Interventional Therapy, National Cancer Center/National Clinical Research Center for Cancer/ Cancer Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100021, China

Introduction

Cancer-related non-variceal upper gastrointestinal bleeding (UGIB) accounts for approximately 5% of all cases of UGIB 1,2. Endoscopic therapy is the mainstay of treatment for non-variceal UGIB 3. However, patients with cancer-related non-variceal UGIB may not be amenable to endoscopic therapy due to patient factors (e.g., hemodynamic instability and coagulopathy) and technical difficulties in performing the procedure (e.g., poor endoscopic visualization and diffuse bleeding). Transcatheter arterial embolization (TAE) is a well-established alternative to surgery for the treatment of non-variceal UGIB in patients who are refractory or not amenable to endoscopic therapy 3. The aim of this multicenter retrospective study was to evaluate the outcomes of TAE for the treatment of cancer-related non-variceal UGIB.

Materials and Methods

One-hundred and seven patients (age: 60.6 ± 13.2 years; 78 men) who underwent TAE for the treatment of cancer-related non-variceal UGIB at five institutions between June 2016 and May 2019 were retrospectively reviewed. Clinical success was defined as no rebleeding within 30 days after TAE. Rebleeding was defined as non-variceal UGIB resulting in a decrease in hemoglobin of > 2 g/dL within 24 hours. The Kaplan-Meier method was used to estimate actuarial probabilities of rebleeding and survival within 30 days after TAE.

Results

Technical success was achieved in 99.1% (106/107) of patients. Positive angiographic findings were observed in 28.0 (30/107) of patients. Empiric embolization was performed in 72.0% (77/107) of patients. Clinical success was achieved in 56.1% (60/107) of patients. The 3-day, 7-day, and 30-day actuarial probabilities of rebleeding were 21.5%, 31.0%, and 44.6%, respectively. Nineteen patients (19/107, 17.8%) died within 30 days after TAE. Of these patients, 14 (14/107, 13.1%) died due to bleeding-related causes. The 3-day, 7-day, and 30-day actuarial probabilities of survival were 91.6%, 88.8%, and 77.4%, respectively. Major complications (gastrointestinal perforation) occurred in one patient (1/107, 0.9%). Minor complications (abdominal pain, fever, and vomiting) occurred in 17.8% (19/107) of patients.

Conclusions

While the clinical success rate of TAE for the treatment of cancer-related non-variceal UGIB may not be high, TAE may be a viable treatment option given its high technical success rate and a very low major complication rate.

References

1. Savides, T. J. et al. Severe upper gastrointestinal tumor bleeding: endoscopic findings, treatment, and outcome. Endoscopy 28, 244-248, doi:10.1055/s-2007-1005436 (1996).
2. Sheibani, S. et al. Natural history of acute upper GI bleeding due to tumours: short-term success and long-term recurrence with or without endoscopic therapy. Alimentary pharmacology & therapeutics 38, 144-150, doi:10.1111/apt.12347 (2013).
3. Barkun, A. N. et al. Management of Nonvariceal Upper Gastrointestinal Bleeding: Guideline Recommendations From the International Consensus Group. Annals of internal medicine 171, 805-822, doi:10.7326/m19-1795 (2019).
4. Sacks, D., McClenny, T. E., Cardella, J. F. & Lewis, C. A. Society of Interventional Radiology Clinical Practice Guidelines. Journal of Vascular and Interventional RadiologyPart 2 14, S199-S202, doi:https://doi.org/10.1097/01.RVI.0000094584.83406.3e (2003).

Session 17-4

Palliative radiotherapy of gastric cancer bleeding

Nuri Hyun Jung

Department of Radiation Oncology, Kangwon National University, Chuncheon City, Korea

Introduction

For patients with advanced gastric cancer, cytotoxic chemotherapy is the major treatment modality. However, chemotherapy alone is frequently inadequate for local symptom palliation. In addition to systemic chemotherapy, local therapy could be effective management for local symptoms, such as bleeding, obstruction, or pain, which is caused by the primary gastric mass. The purpose of this lecture is to introduce the technical aspects of radiation therapy (RT) as a local therapy for advanced gastric cancer.

General palliative dose of RT

RT is well known to be effective for bleeding, obstruction, or pain in patients with advanced gastric cancer. Bleeding could be effectively controlled with dose of 30 Gy (in 10 fractions) which is a general radiation dose for other cancers with palliative purpose (1). However, there is a retrospective study which have shown that bleeding control rate was only 32.4% in low dose RT (<30 Gy), but 71.1% in high dose RT (≥30 Gy) (2). The possible cause of the difference between studies is that the required radiation dose varies depending on the size of the tumor or the type of bleeding. In general, higher radiation dose is required for large-sized tumors or active pumping bleeding. Obstruction due to gastric cancer often requires high radiation dose for significant tumor regression. And RT response to pain depends on the type of cause. If the cause of pain is direct invasion of the gastric cancer, the response to RT could be fair, but if the cause is peritonitis which is related to peritoneal cancer seeding, the response to RT could be limited.

Consideration of higher dose RT

For all local symptoms, including bleeding, obstruction, and pain, the higher RT dose, the better RT response. Since high dose radiation in a large area causes side effects, high dose RT can be considered only when tumor-directed small-field RT is possible. However, the field of current general RT includes about 1-2 cm around stomach. This is because stomach has a lot of internal movement, such as distension and peristalsis. Due to this large-field RT, side effects are occurred not only in stomach, but also in small or large bowels, and for this reason, it is common to do only low-to-moderate dose RT in the stomach area. For more accurate and higher dose RT, techniques for reducing the movement of stomach and separating the tumor and the normal tissue area are being studied.

Conclusions

For patients with gastric cancer bleeding, short-term bleeding control cloud be achieved by general palliative RT dose of 30 Gy. Higher dose RT is required, for long-term bleeding control and tumor regression. Further studies are needed to overcome internal movement of stomach during RT.

References

1. Tey J, Choo BA, Leong CN, et al. Clinical outcome of palliative radiotherapy for locally advanced symptomatic gastric cancer in the modern era. Medicine (Baltimore). 2014;93(22):e118.
2. Kazuya T, Toru S, Masaki K, et al. Palliative radiotherapy for gastric cancer bleeding: a multi-institutional retrospective study. BMC Palliative Care. 2022;21(1):52

Session 17-5

Embolization of post-gastrectomy bleeding

Yozo Sato

Department of Diagnostic Ultrasound & Interventional Radiology
Cancer Institute Hospital of Japanese Foundation for Cancer Research, Tokyo, Japan

Introduction

Although postoperative arterial bleeding after radical gastrectomy for gastric cancer occurs infrequently (2–4% of cases), it is a serious complication because it can be fatal if not properly treated (1, 2).
Traditionally, surgical repair is performed as a standard treatment option. However, the bleeding site is difficult to establish because of local inflammatory response after surgery. Therefore, transcatheter arterial embolization is considered the first-line treatment because of efficacy and less invasiveness despite the risk of organ infarction (3, 4).
Herein, we discuss the clinical features, techniques, and outcomes of transcatheter arterial embolization of post-gastrectomy bleeding.

Clinical features

Postoperative bleedings are mostly observed from the abdominal surgical drains and/or gastrointestinal tract. Early postoperative bleedings (within 24 h after surgery) are treated by surgical repair. Transcatheter arterial embolization are usually performed for late postoperative bleedings (beyond 24 h after surgery).
The common bleeding sources were detected in the common hepatic artery, the splenic artery and the peripancreatic arteries (5).

Techniques and Outcomes

Basically, the catheter is advanced to the distal part of the bleeding portion, and metallic coils are deployed from the distal to the proximal part of the bleeding portion, which is known as isolation or trapping technique. When navigation to the distal portion is difficult because of a tortuous vessel or spasm, a 20%–50% mixture of n-butyl-2-cyanoacrylate (NBCA) and lipiodol is used (4).
The technical and clinical success rates of transcatheter arterial embolization for arterial bleeding after abdominal surgery from 78% to 100% and 61% to 100%, respectively (3-5).

Conclusions

With the recent advancements in interventional techniques, transcatheter arterial embolization has been considered a first-line treatment for post-gastrectomy bleeding.

References

1. Kim MC, Kim W, Kim HH, Ryu SW, Ryu SY, Song KY, et al. Risk factors associated with complication following laparoscopy-assisted gastrectomy for gastric cancer: a large-scale Korean multicenter study. Ann Surg Oncol. 2008;15:2692–700.
2. Park DJ, Lee HJ, Kim HH, Yang HK, Lee KU, Choe KJ. Predictors of operative morbidity and mortality in gastric cancer surgery. Br J Surg. 2005;92:1099–102

3. Zhou C-G, Shi H-B, Liu S, Yang Z-Q, Zhao L-B, Xia J-G, et al. Transarterial embolization for massive gastrointestinal hemorrhage following abdominal surgery. World J Gastroenterol. 2013;19:6869–75
4. Chatani S, Inoue A, Ohta S, Takaki K, Sato S, Iwai T, et al. Transcatheter Arterial Embolization for Postoperative Bleeding Following Abdominal Surgery. Cardiovasc Intervent Radiol. 2018 Sep;41(9):1346-1355.
5. Yang J, Zhang XH, Huang YH, Chen B, Xu JB, Chen CQ, et al. Diagnosis and treatment of abdominal arterial bleeding after radical gastrectomy: a retrospective analysis of 1875 consecutive resections for gastric cancer. J Gastrointest Surg. 2016;20:510–

Session 18-1

How to improve diagnostic yield in indeterminate biliary stricture: Percutaneous transluminal forceps biopsy

Hans-Ulrich Laasch

Department of Radiology, The Christie, Manchester, UK

Introduction

Determining subtypes and even patient-specific genomic detail of cancers is becoming more and more important, as chemotherapy agents are refined and treatments are developed that target certain aspects of the pathway of tumor proliferation. Furthermore, clinical trials and the biobanking increase the need for formal histological samples rather than cytology samples yielded by fine needle aspirate or biliary brushings.

Percutaneous intraductal forceps biopsy can easily be performed during percutaneous transhepatic cholangiography (PTC) and results in harvesting clumps of tissue rather than individual cells.

In the past this was done using endoscopic biopsy forceps, which was cumbersome due to the length of the forceps, but dedicated transhepatic biliary biopsy forceps (TBBF) sets are commercially available, which allow easy introduction of the biopsy process into the workflow for biliary drainage and/or stenting.

Technical Aspects of intraductal Biopsy

1. Access

Access into the bile duct is obtained in the conventional way by ultrasound-guided puncture of a duct upstream to the obstruction using a “skinny” (21 or 22G) Chiba-type or trocar needle. An 0.018” wire is placed and the needle exchanged for a 5 or 6Fr biliary access cannula. Through this a stiff 0.035” wire is inserted and the cannula exchanged for an access sheath.

2. Cytology brushes

No dedicated brushes are available for percutaneous use, endoscopy brushes are around 200cm in length and require at least an 8Fr sheath.

The closed brush should be advanced through the stricture over a wire, the restraining sheath withdrawn and the brush pulled backwards through the stricture, rather than advanced through it. This minimizes the risk of trauma and perforation.

3. Endoscopic biopsy forceps

These can be used if a dedicated percutaenous system is not available. As for cytology brushes, the long length makes these awkward to use.

Depending on the type used, a 9Fr sheath may be required to allow passage into the bile duct.

The risk of perforation is high and minimized by the use of a stiff wire through the stricture and the use of a sheath (vascular or peel-away) long enough to reach the stricture and center the forceps in the lumen of the bile duct.

4. Dedicated percutaneous endoluminal biliary biopsy forceps

A dedicated biopsy kit is available (Transluminal Biliary Biopsy Forceps, Cook Medical, Bloomington, USA), which consists of a 30cm long, 7Fr sheath vascular access sheath and matching spring-loaded biopsy forceps, which are operated with the thumb of one hand.

For best and safest results a stiff wire is passed into the duodenum and the distal end of the sheath placed just above the stricture. The forceps are inserted, opened above the stricture and then advanced into the tumor by pushing them forward with the sheath. This keeps the open jaws central in the lumen of the bile duct, while burying them in the tissue to be biopsied, avoiding injury to the bile duct wall. The jaws are released to close, the forceps are removed and the sample placed in formalin.
This can be repeated as often as required.

Results

Comparative studies have demonstrated transluminal forceps biopsy to be superior to brush cytology in terms of sensitivity as well as predictive value (1,2) and equal to EUS-guided fine needle aspirate (3).
A recent meta-analysis demonstrated.81% sensitivity and 100% specificity for malignancy, but also a 10% complication rate (4). Therefore, good technique, combining use of guide wire and access sheath as described above is important (5).

Conclusions

- Histological biopsy using a dedicated percutaneous kit gives better results than conventional brush cytology
- The procedure is quick, simple and easily integrated into the workflow of percutaneous biliary drainage
- Where PTC is required anyway, it obviates the need for EUS-guided FNA
- Good technique needs to be observed, but this is easily applied

References

1. Tapping CR, Byass OR, Cast JE (2012) Cytological sampling versus forceps biopsy during percutaneous transhepatic biliary drainage and analysis of factors predicting success. Cardiovasc Intervent Radiol 35:883-889
2. Boos J, Yoo RJ, Steinkeler J et al (2018) Fluoroscopic percutaneous brush cytology, forceps biopsy and both in tandem for diagnosis of malignant biliary obstruction. Eur Radiol 28:522-529
3. Mohkam K, Malik Y, Derosas C et al (2017) Percutaneous transhepatic cholangiographic endobiliary forceps biopsy versus endoscopic ultrasound fine needle aspiration for proximal biliary strictures: a single-centre experience. HPB (Oxford) 19:530-537
4. Jeon TY, Choi MH, Yoon SB, Soh JS, Moon SH (2022) Systematic review and meta-analysis of percutaneous transluminal forceps biopsy for diagnosing malignant biliary strictures. Eur Radiol 32:1747-1756

Session 18-2

A novel method of biopsy technique

Tae Jun Song

Division of Gastroenterology, Department of Internal Medicine, University of Ulsan College of Medicine, Asan Medical Center, Seoul, Republic of Korea

Introduction

An indeterminate biliary stricture has been one of the diagnostic challenges for endoscopists. For diagnosis of a biliary stricture, endoscopic retrograde cholangiopancreatography (ERCP) with brush cytology and biopsy is the standard method. Unfortunately, this technique has been shown a low sensitivity for the diagnosis of malignancies in biliary strictures and cannot accurately diagnose about half of patients (1). In addition, these low-sensitivity may lead to delayed diagnosis and treatment of malignant biliary strictures and may increase the healthcare-related cost.

1. The definition of indeterminate biliary stricture

Indeterminate biliary strictures are defined as the biliary strictures which have no definite mass on CT or MRCP and cannot be diagnosed as malignant or benign strictures by ERCP evaluations with brush cytology and forceps biopsy (2). The differential diagnoses of indeterminate biliary strictures are various, ranging from benign to malignant diseases. Biliary strictures may originate from external compression by tumors from liver, gallbladder, pancreas, ampulla, lymph nodes, or metastasis.

2. Peroral cholangioscopy and narrow-band imaging

Due to recent technical developments of cholangioscopy, more accurate diagnosis of indeterminate biliary strictures is now possible with direct visualization and targeted biopsy sampling of the stricture. Peroral cholangioscopy (POC) using an ultra slim endoscope or Spyglass DS system, a kind of single operator cholangioscopy (SOC), enable the improved diagnostic yield of indeterminate biliary strictures. Especially when accompanied by narrow-band imaging (NBI), detailed visualization of surface mucosal structures and microvessels can be possible. NBI may help to delineate tumor margins (3).

3. Novel biopsy methods during ERCP

Although ERCP is one of the most commonly used diagnostic methods for the evaluation of biliary strictures, its sensitivity is relatively low. SOC using SpyGlass DS is a relatively new diagnostic modality for biliary strictures that can perform target biopsy under direct visualization. According to published reports, cholangioscopy-guided biopsies provide more accurate diagnosis than conventional ERCP-guided biopsies. However, SOC has limitations in that the small accessory channel allows the passage only of the dedicated biopsy forceps, as well as its high cost. To overcome these limitations, new biopsy methods such as a novel tube-assisted biopsy (TAB) method for indeterminate biliary strictures have been developed. Ko et al. showed that TAB is a safe and potentially accurate biopsy approach for assessing indeterminate biliary strictures (4).

4. Probe-based confocal laser endomicroscopy

A probe-based confocal laser endomicroscopy(p-CLE) provides an in vivo histological evaluation of the biliary mucosa and a real-time endoscopic visualization of the histology of the biliary system without histologic biopsy. The p-CLE procedure requires an intravenous fluorescein injection to enhance the vascular structures at the mucosa. Recent meta-analysis including eight studies evaluate the

outcomes of p-CLE for the diagnosis of indeterminate biliary strictures and shows 90% and 75% pooled sensitivity and specificity (5). The Paris classification in the diagnosis of indeterminate biliary strictures increased specificity from 67% to 83.3% without impacting the overall accuracy of 83%.

5. Endoscopic ultrasound fine-needle aspiration (EUS-FNA)

Endoscopic ultrasound fine-needle aspiration (EUS-FNA) has been used for obtaining histological samples from biliary lesions, showing an 87% sensitivity and 87% accuracy (6). In another study, EUS-FNA showed significantly superior to ERCP with brush cytology and forceps biopsy (93.8% sensitivity and 94% accuracy with EUS-FNA versus 60% sensitivity and 62% accuracy with ERCP, P=0.034) (7). However, when these two procedures were combined in a single session, they reached a 97.9% sensitivity and 98% accuracy.

Conclusions

Accurate diagnostic and sampling methods can lead to optimal management and reduce both overtreatment and undertreatment. In clinical practice, accurate diagnosis of indeterminate biliary strictures is still challenging. Patients can benefit with highly sensitive diagnostic methods due to early detection and curative treatment. Various techniques have been evolved from conventional ERCP with brush cytology and biopsy to SOC, EUS-FNA or CLE to overcome the limitation of conventional methods for indeterminate biliary strictures. However, we still have many hurdles to clear.

References

1. Roberto Oleas, Juan Alcívar-Vasquez, Carlos Robles-Medranda. New technologies for indeterminate biliary strictures. Transl Gastroenterol Hepatol 2022;7:22
2. Sethi A, Howell DA. The Indeterminate Biliary Stricture. In: Chandrasekhara V, Khashab M, Elmunzer BJ, et al. editors. 3rd edition. Clinical Gastrointestinal Endoscopy.Elsevier, 2019 ;699-712.e4.
3. Il Sang Shin, Jong Ho Moon, Yun Nah Lee, Hee Kyung Kim, Tae Hoon Lee, Jae Kook Yang, Sang-Woo Cha, Young Deok Cho, Sang-Heum Park. Efficacy of narrow-band imaging during peroral cholangioscopy for predicting malignancy of indeterminate biliary strictures (with videos). Gastrointest Endosc 2022;96:512-521
4. Sung Woo Ko, Sang Soo Lee, Hoonsub So, Jun Seong Hwang, Tae Jun Song, Sung Koo Lee, Myung-Hwan Kim. A novel method of biopsy for indeterminate pancreaticobiliary strictures: tube-assisted biopsy. Endoscopy 2020;52:589-594
5. Liu Y, Lu Y, Sun B, et al. Probe-based confocal laser endomicroscopy for the diagnosis of undetermined biliary stenoses: A meta-analysis. Clin Res Hepatol Gastroenterol 2016;40:666-73
6. Onda S, Ogura T, Kurisu Y, et al. EUS-guided FNA for biliary disease as first-line modality to obtain histological evidence. Therap Adv Gastroenterol 2016;9:302-12
7. Moura DTH, de Moura EGH, Matuguma SE, et al. EUS-FNA versus ERCP for tissue diagnosis of suspect malignant biliary strictures: a prospective comparative study. Endosc Int Open 2018;6:E769-77

Session 18-3

Optimal methods to improve diagnostic yield of cytology/biopsy

Sung Ill Jang

Department of Internal Medicine, Institute of Gastroenterology Gangnam Severance Hospital, Yonsei University College of Medicine, Korea

Introduction

Cytological assessment of malignant biliary strictures using specimens obtained during endoscopic retrograde cholangiography (ERCP) is typically performed. Identification of biliary stricture malignancies using endobiliary brushing cytology specimens is important for decision of treatment and prognosis prediction. However, the sensitivity of brushing cytology specimens based on Papanicolaou (Pap) staining is low, which hinder accurate diagnosis of indeterminate strictures. To increase the sensitivity of brushing cytology, several studies have been performed.

Main Body

Obtaining larger specimens has been tried to increase the sensitivity of brushing cytology. Post-brushing biliary lavage fluid collection, [1] bile juice collection from the ERCP sheath tube, [2] triple-tissue sampling, [3] cell-block technique [4] and basket cytology [5] all improve the sensitivity of brushing cytology. Intraductal ultrasonography has a sensitivity of 80–90% and specificity of 83–92% for biliary strictures. however, biopsies cannot be obtained using intraductal ultrasonography. [6,7] The pooled sensitivity and specificity of peroral cholangioscopy–guided biopsy for diagnosing malignant biliary strictures are 60.1% and 98.0%, respectively. [8] The procedure has a high rate of complications due to the sphincterotomy and cholangitis, and its sensitivity is still unsatisfactory. Moreover, performing peroral cholangioscopy with biopsy is difficult at distal bile duct lesions. Probe-based confocal laser endomicroscopy (pCLE) can be used to visualize pathologic changes in blood vessels and cells proximal to the stricture. [9] pCLE has a sensitivity of 83–98% and specificity of 33–88%, but need to be evaluated in larger prospective cohorts to enable an implementation in diagnostic algorithms. [10]

Immunohistochemistry(IHC) can be performed to detect cancer-specific molecular alterations. For example, 37–54% of cholangiocarcinoma tissues are immunoreactive for p53. [11] The sensitivity of p53 IHC alone is 24% but increases to 43% when combined with conventional cytology. [12] These values were obtained from studies involving both pancreatic and bile duct strictures, and the sensitivity was approximately 43–50.6%. [11,13] IHC for minichromosome maintenance replication proteins has a PPV of 97% but a sensitivity of 66%. [14,15] Fluorescence in situ hybridization (FISH) may be more readable and more objective than CCM. [16-18] However, a meta-analysis found that FISH has a sensitivity of 68% and specificity of 70%, similar to those values obtained with CCM. [19] A biomarker panel combining four DNA methylation biomarkers in bile duct carcinoma has a sensitivity of 85% and specificity of 98%. [20] Despite substantial efforts, no method has demonstrably increased the sensitivity of brushing cytology.

Recently, cancer-specific molecular assays are under investigation. Immunofluorescence (IF) staining procedure targeting cytosolic methionyl-tRNA synthetase 1 (MARS1) in distal biliary strictures has the high sensitivity and accuracy in detection of malignancy in patients with indeterminate biliary strictures. In a pilot study, the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy were 70.4%, 96.2%, 97.4%, 56.8%, and 78.8%, respectively, for conventional Pap staining, and 98.1%, 96.1%, 98.1%, 96.2%, and 97.5%, respectively, for MRS IF. And in the multicenter study, the diagnostic parameters (sensitivity, specificity, positive predictive value, negative predictive value, and accuracy) of the MARS1 IF (93.6%, 96.7%, 98.7%, 85.5%, and 94.5%, respectively) and conventional Pap (73.2%, 100%, 100%, 59.2%, and 80.7%, respectively) staining methods differed significantly ($p < 0.0001$).

Conclusions

Endobiliary brushings are routinely used in the diagnosis, treatment, and prognostication of biliary strictures. To increase the sensitivity of conventional brushing cytology, techniques for collecting larger specimens have been tested and an advanced endoscopic modality has been invoked. The high sensitivity and accuracy of MARS1 IF staining enabled detection of malignancy in patients with indeterminate biliary strictures.

References

1. Sugimoto, S.; Matsubayashi, H.; Kimura, H.; Sasaki, K.; Nagata, K.; Ohno, S.; Uesaka, K.; Mori, K.; Imai, K.; Hotta, K. et al. Diagnosis of bile duct cancer by bile cytology: Usefulness of post-brushing biliary lavage fluid. Endoscopy international open 2015, 3, E323-328.
2. Wakasa, T.; Inayama, K.; Honda, T.; Shintaku, M.; Okabe, Y.; Kakudo, K. Brushing cytology of the biliary tract: Bile juice from the ercp sheath tube provides cell-rich smear samples. Acta cytologica 2014, 58, 398-405.
3. Lee, S.J.; Lee, Y.S.; Lee, M.G.; Lee, S.H.; Shin, E.; Hwang, J.H. Triple-tissue sampling during endoscopic retrograde cholangiopancreatography increases the overall diagnostic sensitivity for cholangiocarcinoma. Gut and liver 2014, 8, 669-673.
4. Jo, Y.G.; Lee, T.H.; Cho, H.D.; Park, S.H.; Park, J.M.; Cho, Y.S.; Jung, Y.; Chung, I.K.; Choi, H.J.; Moon, J.H. et al. Diagnostic accuracy of brush cytology with direct smear and cell-block techniques according to preparation order and tumor characteristics in biliary strictures. The Korean journal of gastroenterology = Taehan Sohwagi Hakhoe chi 2014, 63, 223-230.
5. Bang, K.B.; Kim, H.J.; Park, J.H.; Park, D.I.; Cho, Y.K.; Sohn, C.I.; Jeon, W.K.; Kim, B.I. Comparison of brush and basket cytology in differential diagnosis of bile duct stricture at endoscopic retrograde cholangiopancreatography. Hepatobiliary & pancreatic diseases international : HBPD INT 2014, 13, 622-627.
6. American Society for Gastrointestinal Endoscopy Standards of Practice, C.; Anderson, M.A.; Appalaneni, V.; Ben-Menachem, T.; Decker, G.A.; Early, D.S.; Evans, J.A.; Fanelli, R.D.; Fisher, D.A.; Fisher, L.R. et al. The role of endoscopy in the evaluation and treatment of patients with biliary neoplasia. Gastrointestinal endoscopy 2013, 77, 167-174.
7. Tringali, A.; Lemmers, A.; Meves, V.; Terheggen, G.; Pohl, J.; Manfredi, G.; Hafner, M.; Costamagna, G.; Deviere, J.; Neuhaus, H. et al. Intraductal biliopancreatic imaging: European society of gastrointestinal endoscopy (esge) technology review. Endoscopy 2015, 47, 739-753.
8. Navaneethan, U.; Hasan, M.K.; Lourdusamy, V.; Njei, B.; Varadarajulu, S.; Hawes, R.H. Single-operator cholangioscopy and targeted biopsies in the diagnosis of indeterminate biliary strictures: A systematic review. Gastrointestinal endoscopy 2015, 82, 608-614 e602.
9. Meining, A.; Shah, R.J.; Slivka, A.; Pleskow, D.; Chuttani, R.; Stevens, P.D.; Becker, V.; Chen, Y.K. Classification of probe-based confocal laser endomicroscopy findings in pancreaticobiliary strictures. Endoscopy 2012, 44, 251-257.
10. Voigtlander, T.; Lankisch, T.O. Endoscopic diagnosis of cholangiocarcinoma: From endoscopic retrograde cholangiography to bile proteomics. Best practice & research. Clinical gastroenterology 2015, 29, 267-275.
11. Stewart, C.J.; Burke, G.M. Value of p53 immunostaining in pancreatico-biliary brush cytology specimens. Diagnostic cytopathology 2000, 23, 308-313.
12. Glasbrenner, B.; Ardan, M.; Boeck, W.; Preclik, G.; Moller, P.; Adler, G. Prospective evaluation of brush cytology of biliary strictures during endoscopic retrograde cholangiopancreatography. Endoscopy 1999, 31, 712-717.
13. Tascilar, M.; Sturm, P.D.; Caspers, E.; Smit, M.; Polak, M.M.; Huibregtse, K.; Noorduyn, L.A.; Offerhaus, G.J. Diagnostic p53 immunostaining of endobiliary brush cytology: Preoperative cytology compared with the surgical specimen. Cancer 1999, 87, 306-311.
14. Ayaru, L.; Stoeber, K.; Webster, G.J.; Hatfield, A.R.; Wollenschlaeger, A.; Okoturo, O.; Rashid, M.; Williams, G.; Pereira, S.P. Diagnosis of pancreaticobiliary malignancy by detection of minichromosome maintenance protein 5 in bile aspirates. British journal of cancer 2008, 98, 1548-1554.
15. Keane, M.G.; Huggett, M.T.; Chapman, M.H.; Johnson, G.J.; Webster, G.J.; Thorburn, D.; Mackay, J.; Pereira, S.P. Diagnosis of pancreaticobiliary malignancy by detection of minichromosome maintenance protein 5 in biliary brush cytology. British journal of cancer 2017, 116, 349-355.
16. Fritcher, E.G.; Kipp, B.R.; Halling, K.C.; Oberg, T.N.; Bryant, S.C.; Tarrell, R.F.; Gores, G.J.; Levy, M.J.; Clayton, A.C.; Sebo, T.J. et al. A multivariable model using advanced cytologic methods for the evaluation of indeterminate pancreatobiliary strictures. Gastroenterology 2009, 136, 2180-2186.
17. Chaiteerakij, R.; Barr Fritcher, E.G.; Angsuwatcharakon, P.; Ridtitid, W.; Chaithongrat, S.; Leerapun, A.; Baron, T.H.; Kipp, B.R.; Henry, M.R.; Halling, K.C. et al. Fluorescence in situ hybridization compared with conventional cytology for the diagnosis of malignant biliary tract strictures in asian patients. Gastrointestinal endoscopy 2016, 83, 1228-1235.
18. Barr Fritcher, E.G.; Voss, J.S.; Brankley, S.M.; Campion, M.B.; Jenkins, S.M.; Keeney, M.E.; Henry, M.R.; Kerr, S.M.; Chaiteerakij, R.; Pestova, E.V. et al. An optimized set of fluorescence in situ hybridization probes for detection of pancreatobiliary tract cancer in cytology brush samples. Gastroenterology 2015, 149, 1813-1824 e1811.
19. Koro, N.S.; Elmunzer, B.J.; Cote, G.A. “Fishing” for an accurate diagnostic test for cholangiocarcinoma. Gastroenterology 2015, 148, 655-657.
20. Andresen, K.; Boberg, K.M.; Vedeld, H.M.; Honne, H.; Jebsen, P.; Hektoen, M.; Wadsworth, C.A.; Clausen, O.P.; Lundin, K.E.; Paulsen, V. et al. Four DNA methylation biomarkers in biliary brush samples accurately identify the presence of cholangiocarcinoma. Hepatology 2015, 61, 1651-1659.

Session 18-4

Utility of Single Operator Cholangioscopy (SOC) in Indeterminate Biliary Stricture

Sunguk Jang

Gastroenterology and Hepatology, Digestive Disease and Surgical Institute, Cleveland Clinic, USA

Indeterminate stricture is generally defined as a stricture without clear identifiable cause(s) such as choledocholithiasis or known malignant process after extensive imaging and endoscopic evaluations that often include endoscopic retrograde cholangiopancreatography (ERCP) with sampling by cytology or blind biopsy of bile duct. The dilemma of indeterminate stricture is that over time, the majority will eventually declare as a malignant process, making timely and accurate diagnosis even more critical.

There are several endoscopic tools available to evaluate and manage biliary stricture. ERCP allows fluoroscopic images to locate and assess the extent of stricture. It is however rather poor in its ability to discern benign stricture from a malignant one. Furthermore, cytologic and histologic sampling with traditional ERCP yield rather poor results with accuracy less than 40 % with brush alone and less than 60% with biopsy plus minus brush cytology.

Intraductal ultrasound is a ultrasound probe that can visualize the biliary ductal wall sonographically. It maybe helpful in assessing the extension of known ampullary neoplasm to bile duct, but otherwise limited. Endoscopic ultrasound (EUS) provides transluminal sonographic visualization of bile duct and adjacent structures. It competes with cholangioscopy in terms of diagnostic yield and utilization.

Finally, direct per-oral cholangioscopy, allows direct visualization of bile duct with varying degree of clarity while allowing acquisition of samples and a range of therapeutic maneuvers.

The first generation of disposable single operator cholangioscope (SOC) was launched in 2007 under the brand name of SpyGlass. It has disposable 10Fr, 4-way steerable catheter that contains 1.2mm working channel, two 0.6mm water and air channel with 0.9mm optic channel through which reusable fiber-optic probe could be inserted. The fiber optic provided 6000-pixel image quality and was reusable.

The second generation SpyGlass (Digital Spy) has become a single disposable unit with digital video assisted optic which increased the image resolution up to 4 times with 60% wider field of view.

SpyGlass allows therapeutic works including lithotripsy using electrohydraulic lithotripsy (EHL) or laser from Holmium-YAG.
SpyGlass is also useful in the evaluation of biliary stricture. Visual cues obtained during cholangioscopic examination allows a reasonable discernment between benign and malignant type of biliary stricture. A study published by Cleveland Clinic Endoscopy Group in 2019 reported visual accuracy close to 90% and sensitivity greater than 80% in distinguishing malignant stricture from previously deemed indeterminate. A recent comparative study from Korean therapeutic biliary endoscopy group reported a comparable diagnostic accuracy between EUS guided fine needle aspiration (FNA) and SOC with SpyGlass

SOC is not without the risks unique to cholangioscopy. The known adverse outcomes include pancreatitis, cholangitis and bile duct perforation.

In summary, at the hands of biliary endoscopy experts, SpyGlass and other SOCs provide meaningful improvement in diagnostic and therapeutic works involving bile duct pathologies.

Session 19-1

Non-invasive imaging of intrahepatic malignant disease

Sunyoung Lee

Department of Radiology, Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Contents

We discuss noninvasive imaging findings that help to differentiate intraductal papillary neoplasm of the bile duct (IPNB) with associated invasive carcinoma from IPNB with intraepithelial neoplasia and to investigate their significance with respect to long-term outcomes. Significant magnetic resonance (MR) imaging findings for differentiating IPNB with associated invasive carcinoma from IPNB with intraepithelial neoplasia include intraductal visible mass, tumor size ≥ 2.5 cm, multiplicity of the tumor, bile duct wall thickening, and adjacent organ invasion. Significant MR imaging findings of IPNB with associated invasive carcinoma have a negative impact on prognosis.

References

1. Intraductal Papillary Neoplasm of the Bile Duct: Assessment of Invasive Carcinoma and Long-Term Outcomes using MRI. J Hepatol. 2019 Apr;70(4):692-699.

Session 19-2

Approaches to IPNB using single-operator peroral cholangioscopy

Yousuke Nakai

Department of Endoscopy and Endoscopic Surgery, The University of Tokyo Hospital, Tokyo, Japan

Intraductal papillary neoplasm of the bile duct (IPNB) is a pre-invasive neoplasm of the bile duct and established as a precursor lesion of invasive cholangiocarcinoma. The disease can involve any part of the biliary tract and preoperative evaluation by radiologic and endoscopic modalities is essential. While dynamic CT and MRI with MR-cholangiopancreatography are utilized as radiological evaluation, endoscopic evaluation includes endoscopic ultrasonography (EUS) and endoscopic retrograde cholangiopancreatography (ERCP) with peroral cholangiopancreatoscopy (POCS). EUS allows both longitudinal and vertical extension of the bile duct tumor, and POCS allows detailed longitudinal extension along the bile duct. While Type I IPNB is predominantly located in the intrahepatic bile duct and characteristic of excessive mucin production, Type II IPNB is located in the extrahepatic bile duct and produce little mucin. During POCS evaluation for IPNB with abundant mucin, the advantage of single operator POCS is its ability for irrigation and suction to remove mucin. In addition, easy maneuverability with 4-way deflection allows thorough visualization of the biliary tract, including the intrahepatic bile duct. Endoscopic investigation of IPNB using EUS and ERCP with POCS will be shown in the lecture.

Session 19-3

Approaches using direct peroral cholangioscopy

Yun Nah Lee

Digestive Disease Center and Research Institute, Department of Internal Medicine,
Soon Chun Hyang University School of Medicine, Bucheon, Korea

Introduction

According to the World Health Organization Classification of Tumors of the Digestive System in 2019, intra-ductal papillary neoplasms of the bile duct (IPNB) is a preinvasive, intraductal growing tumor originating from the bile epithelium, consisting of papillary and villous structures. However, it can be miss or underdiagnosed by cross-sectional imaging studies and/or cholangiography. Recently, as peroral cholangioscopy (POC) which is easy to maneuver in high image quality has been developed, POC is emerging as one of the diagnostic methods of bile duct diseases. Among them, direct peroral cholangioscopy (POC) using an ultra-slim endoscope is a useful modality because of its various advantages to evaluate IPNB.

Main Body

IPNB presents as an intraductal mass within the dilated intrahepatic or extrahepatic bile ducts on imaging studies. However, small-sized papillary lesions may be difficult to detect by conventional imaging studies such as ultrasonography (US) or computed tomography (CT). Recently, magnetic resonance (MR) imaging with MR cholangiography is being commonly used as the imaging modality of choice for evaluating various biliary diseases. MR imaging with MR cholangiography has advantages in the detection and evaluation of small intraductal tumor and tumor multiplicity of IPNB.1, 2 However, these modalities may not ensure an accurate diagnosis because the presence of mucus, which is characteristics of IPNB, must be verified, and superficial expansion and progression of IPNB are often to the extent beyond our expectation.3

Endoscopic retrograde cholangiopancreatography (ERCP) can demonstrate characteristic finding of IPNB such as diffuse bile duct dilation with amorphous filling defects. On ERCP, mucin draining through the ampulla and a patulous ampulla is the characteristic finding.4 Cholangiographic examination also has the advantages of identifying the extent of tumor growth and providing the pathological diagnosis. However, ERCP-guided biopsy for IPNB is showed as a low sensitivity for the diagnosis of associated invasive disease.5 And, it can be difficult to evaluate an accurate extent of superficial spreading mucosal lesion of IPNB only by cholangiography.

Therefore, the role of POC is important and irreplaceable in the diagnosis of IPNB. POC allows to visualize the bile duct directly and assess the extent of the tumor.6, 7 POC is traditionally only conducted using a mother-baby scope system requiring two skilled endoscopists. Subsequently, POC systems operated by single-operator have been introduced followed by SpyGlass direct visualization system (Boston Scientific, Natick, MA, USA) and direct POC.8 Among them, direct POC using an ultra-slim endoscope allows high-quality endoscopic imaging with image-enhanced cholangioscopy, performance of more procedures using the larger 2.0-2.2 mm working channel, and use of standard endoscopy equipment. Image-enhanced technique such as narrow band image (NBI) and i-SCAN can provide detailed images of the superficial mucosal surface of the bile duct under direct POC.7, 9, 10 So, they are considered to be useful for detection of superficial mucosal lesion and/or invasive cholangiocarcinoma in IPNB. Direct POC enables to obtain enough amounts of tissue sampling under direct visualization due to a 2.0-2.2 mm working channel of an ultra-slim endoscope. However, technical difficulty in advancing an ultra-slim endoscope into the biliary tree has hampered performance of direct POC. In addition, the evaluation of the non-dilated intrahepatic bile duct can be limited to be evaluated by direct POC because the outer diameters of ultra-slim endoscopes are 5 to 6 mm.

Conclusions

IPNB is a rapidly emerging, newly recognized pre-invasive neoplasm of the bile duct with high malignant potential and is frequently followed by invasive cholangiocarcinoma. POCs including a direct POC are useful for diagnosis of localization and progression in IPNB. It is important to determine an operative method based on information obtained through POC and to observe clinical course.

References

1. Joo I, Lee JM. Imaging bile duct tumors: pathologic concepts, classification, and early tumor detection. Abdom Imaging 2013;38:1334-50.
2. Joo I, Lee JM, Yoon JH. Imaging Diagnosis of Intrahepatic and Perihilar Cholangiocarcinoma: Recent Advances and Challenges. Radiology 2018;288:7-13.
3. Sakai Y, Ohtsuka M, Sugiyama H, et al. Current status of diagnosis and therapy for intraductal papillary neoplasm of the bile duct. World J Gastroenterol 2021;27:1569-1577.
4. Yeh TS, Tseng JH, Chiu CT, et al. Cholangiographic spectrum of intraductal papillary mucinous neoplasm of the bile ducts. Ann Surg 2006;244:248-53.
5. Ohtsuka M, Shimizu H, Kato A, et al. Intraductal papillary neoplasms of the bile duct. Int J Hepatol 2014;2014:459091.
6. Itoi T, Sofuni A, Itokawa F, et al. Peroral cholangioscopic diagnosis of biliary-tract diseases by using narrow-band imaging (with videos). Gastrointest Endosc 2007;66:730-6.
7. Igarashi Y, Okano N, Ito K, et al. Effectiveness of peroral cholangioscopy and narrow band imaging for endoscopically diagnosing the bile duct cancer. Dig Endosc 2009;21 Suppl 1:S101-2.
8. Moon JH, Terheggen G, Choi HJ, et al. Peroral cholangioscopy: diagnostic and therapeutic applications. Gastroenterology 2013;144:276-282.
9. Mounzer R, Austin GL, Wani S, et al. Per-oral video cholangiopancreatoscopy with narrow-band imaging for the evaluation of indeterminate pancreaticobiliary disease. Gastrointest Endosc 2017;85:509-517.
10. Lee YN, Moon JH, Choi HJ, et al. Direct peroral cholangioscopy for diagnosis of bile duct lesions using an I-SCAN ultraslim endoscope: a pilot study. Endoscopy 2017;49:675-681.

Session 19-4

Approaches using direct percutaneous transhepatic cholangioscopy

Dongwook Oh

Department of Gastroenterology, University of Ulsan College of Medicine, Asan Medical Center, Seoul, Korea

Introduction

Intraductal papillary neoplasm of the bile duct (IPNB) is a rare variant of bile duct tumors, which is characterized by papillary or villous growth within the bile duct lumen. Histologically, IPNB is benign disease, but has a great potential for malignant transformation. As the concept of IPNB has evolved recently, it is now regarded as a precursor lesion of cholangiocarcinoma, together with biliary intraepithelial neoplasia and mucinous cystic neoplasm.1 Imaging features of IPNB can vary according to the presence of intraductal lesions, degree of mucin production, and tumor location.2 Therefore, diagnosis of IPNB is challenging due to these various morphologies.

Diagnostic role of percutaneous transhepatic cholangioscopy

IPNB typically manifests as biliary tree dilatation, focal or diffuse, depending on the location of the tumor. The obstruction generally can be either secondary to the viscous mucin or due to the tumor mass effect, depending on which component is predominant: papillary proliferation or mucin production.3 Excessive mucin production may lead to a cystic or aneurysmal dilatation of a bile duct. To select the appropriate surgical procedure, an accurate preoperative assessment of the tumor location and extent is important. However, this assessment can be challenging owing to small tumors, multiple tumors, and the superficial spreading pattern of IPNB.

Cholangioscopic evaluation provided detailed information on the extent of IPNB and enabled the appropriate surgical treatment to be provided. Percutaneous transhepatic cholangioscopy (PTCS) evaluation has several advantages over conventional radiological imaging: it may visualize the bile duct mucosa directly and detect small or subtle mucosal lesions that are not evident on direct cholangiograms. Because small papillary lesions may not be detected using conventional radiological methods, these undetected lesions, usually remote from the main tumor, may be the foci of recurrence.4 Recently, peroral cholangioscopy has been proved useful diagnostic modality for direct visualization of bile duct. However, PTCS is able to complete evaluation of the intrahepatic duct as compared to peroral cholangioscopy. Therefore, PTCS has still the role for preoperative procedure for determining treatment modality and the appropriate extent of resection in intrahepatic IPNB. the appropriate extent of resection in intrahepatic IPNB.

Treatment role of percutaneous transhepatic cholangioscopy

Although surgical resection is the treatment of choice for IPNBs, local treatment, including argon plasma coagulation (APC), photodynamic therapy (PDT), and radiofrequency ablation (RFA) can be considered as an alternative treatment in patients who cannot tolerate surgery due to underlying medical conditions. Although there has been no large-scale study, local ablation therapy with PTCS for IPNB has been tried and has shown promising results. APC uses argon gas to deliver plasma of evenly distributed thermal energy to a field of tissue adjacent to the probe.5 APC help improve quality of life by reducing tumor size, reducing jaundice, or reducing symptom. However, when compared to surgical treatment, these modalities have a higher rate of tumor recurrence because of limitations such as low penetration depth and a small extent. PTCS-guided PDT has advantages over conventional cholangiography in determining the appropriate location of the PDT probe and accurately evaluating tumor extent. PDT showed early promise but has demonstrated a high complication rate including cholangitis due to necrosis in adjacent normal tissue and photosensitivity.6 Recently, radiofrequency ablation (RFA), which induces coagulative necrosis of tumor tissue by a controlled temperature rise, has been widely employed as a method of tumor ablation. RFA has been adopted in a few IPNB cases and achieved promising results. However, RFA is effective for only small to medium-sized

tumors because it uses heat to achieve contact coagulative necrosis of surrounding tissue.

Conclusions

For the diagnosis of IPNB, cholangioscopy is considered mandatory to identify accurate localization and progression. Although PTCS is a time-consuming, cumbersome procedure, PTCS has its own indispensable diagnostic role. In therapeutics, PTCS-guided local treatment is useful in patients with IPNBs.

References

1. Zen Y, Pedica F, Patcha VR, et al. Mucinous cystic neoplasms of the liver: a clinicopathological study and comparison with intraductal papillary neoplasms of the bile duct. Mod Pathol 2011;24:1079-89. https://doi.org/10.1038/modpathol.2011.71
2. Kim H, Lim JH, Jang KT, et al. Morphology of intraductal papillary neoplasm of the bile ducts: radiologic-pathologic correlation. Abdom Imaging 2011;36:438-46. https://doi.org/10.1007/s00261-010-9636-2
3. Chatterjee A, Lopes Vendrami C, Nikolaidis P, et al. Uncommon Intraluminal Tumors of the Gallbladder and Biliary Tract: Spectrum of Imaging Appearances. Radiographics 2019;39:388-412. https://doi.org/10.1148/rg.2019180164
4. Kim WJ, Hwang S, Lee YJ, et al. Clinicopathological Features and Long-Term Outcomes of Intraductal Papillary Neoplasms of the Intrahepatic Bile Duct. J Gastrointest Surg 2016;20:1368-75. https://doi.org/10.1007/s11605-016-3103-5
5. Brauer BC, Fukami N, Chen YK. Direct cholangioscopy with narrow-band imaging, chromoendoscopy, and argon plasma coagulation of intraductal papillary mucinous neoplasm of the bile duct (with videos). Gastrointest Endosc 2008;67:574-6. https://doi.org/10.1016/j.gie.2007.07.031
6. Topazian M, Zhong N, Baron TH, et al. Photodynamic therapy of intraductal papillary mucinous neoplasm. Endoscopy 2012;44:213-5. https://doi.org/10.1055/s-0031-1291539

Pearls of SGI Case Conference

Simultaneous puncture of the common bile duct and intrahepatic bile duct under the X-ray fluoroscopy to connect both ducts

Jin Woo Choi

Department of Radiology, Seoul National University Hospital, Korea

A 73-year-old woman with a percutaneous transbiliary drainage (PTBD) tube in the right hepatic duct was referred to interventional radiology. The patient had undergone left hemihepatectomy due to recurrent pyogenic cholangitis in an outside hospital. On computed tomography (CT) images, the right intrahepatic duct (IHD) and common bile duct (CBD) was separated by intervening surgical materials. Therefore, a hepatic surgeon performed hepaticojejunostomy to connect the right IHD and jejunum, but the post-surgical CT images showed that only a minor IHD was anastomosed with the bowel, whereas the main IHD was still isolated. The surgeon said that surgical management was impossible due to severe adhesion in the operation bed, and requested interventional management. Although interventional radiologists have tried to select the CBD via the right PTBD tract multiple times, a guidewire was not able to advance into the CBD. Afterwards, an endoscopist attempted to navigate the right IHD from CBD using Spyglass, but the endoscopist also failed to connect the IHD and CBD. As the patient strongly wanted to remove the PTBD tube, the interventional radiologist decided to do the last try. On fluoroscopy, the operator found air shadow in the CBD because of previous sphincterectomy. Therefore, the CBD was percutaneously punctured by a 21-gauge needle and the needle was further advanced to the right IHD aiming the pigtail of PTBD tube. Afterwards, a “0.018 guidewire was passed from the CBD puncture site to the PTBD insertion site. The tract was serially dilated using 4 mm x 5 cm, 6 mm x 4 cm, and 10 mm x 4cm balloons, and a 14-Fr pigtail catheter was inserted to the CBD from the PTBD puncture site. The patient was planned to keep the tube for 3 months, and then switched to the internal drainage.

Pearls of SGI Case Conference

A case of successful removal of brush cytology tip in left intrahepatic duct

Jin Ho Choi

Department of Internal Medicine, Liver Research Institute, Seoul National University College of Medicine, Seoul, Korea

Brush cytology and forceps biopsy is essential in diagnosing malignant biliary stricture. Due to the low sensitivity of forceps biopsy under ERCP, brush cytology is usually performed simultaneously. In case of common bile duct stricture, both forceps and brush could easily approach the lesion. But intrahepatic duct, especially left, is hard to approach using forceps. So when the stricture is located in intrahepatic duct, brush cytology is commonly used. Here, we introduce a case of broken brush tip during ERCP which was removed successfully by radiologic intervention.

A 76-year-old man visited veteran affair hospital for routine check-up. There wasn't any specific finding except mild anemia. To assure the possibility of hidden malignancy PET-CT was done. The FDG uptake was found in umbilical fissure of left lobe of liver. MRI revealed bile duct stricture in segment 4. In laboratory test, there wasn't any abnormality in liver function test. Only IgG4 level was high as 689 mg/dL. To evaluate the disease extent, CT was done There was an 3cm sized ill-defined, low attenuated lesion involving B4 and LLsectoral bile duct. We planned histologic confirmation via ERCP. During ERCP, the guide wire passed into the left intrahepatic duct and cytology brush was passed into left intrahepatic duct along the guide wire. In this procedure, the tip of brush was broken. To remove the brush tip, we utilized balloon catheter, basket, and forceps. Despite these efforts, the brush tip was pushed into the distal part of the bile duct. We finished our exam with ENBD. To remove the brush tip, radiologic intervention was tried via PTBD. Finally brush tip was removed by snare through PTBD. The patient was discharged and PTBD removed in outpatient department. After few weeks of oral steroid therapy, the stricture and wall thickening was resolved.

In conclusion, it was our first case of broken brush cytology tip which was removed by percutaneous approach. Endoscopist should know that brush tip could be broken and attention is needed during ERCP.

Keywords: Biliary stricture, Brush cytology, ERCP

EUS-guided gastrojejunostomy in malignant gastric outlet obstruction: A case report

Sung Hyun Cho

Division of Gastroenterology, Department of Internal Medicine, Asan Medical Center, Korea

Introduction

In patients with malignant gastric outlet obstruction (MGOO) in advanced malignancy, endoscopic placement of stent is often performed for endoscopic palliation. However, in case of tight stricture in which guide wire cannot be advanced through the stricture, endoscopic stent insertion is challenging. Here, we report a case of EUS-guided gastrojejunostomy (EUS-GJ) using lumen-apposing metal stent (LAMS) in management of MGOO.

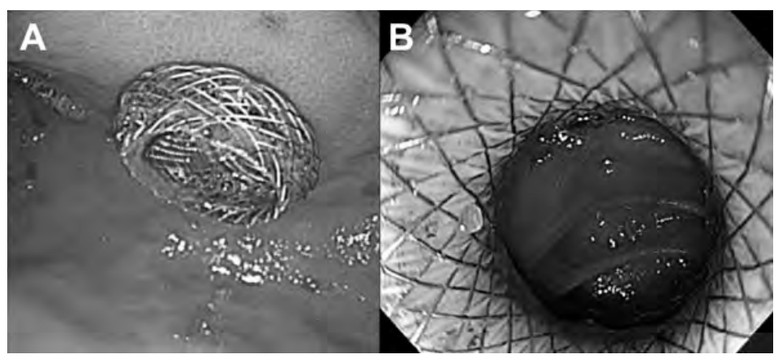
Case Report

A 42-year-old-man who was diagnosed with duodenal obstruction induced by retroperitoneal liposarcoma. For palliation, endoscopic duodenal stent insertion was successfully performed. Two months later after duodenal stenting, gastric outlet obstruction newly occurred because of cancer progression. Conventional endoscopic stent placement was failed because guidewire could not be advanced into the tight stricture. Then, we performed EUS-GJ using LAMS for management of MGOO (Figure 1. A-B). Follow-up endoscopy at 1 day after procedure showed well placement of LAMS. After EUS-GJ, the patient was able to tolerate food intake.

Conclusion

In patients with MGOO who failed conventional endoscopic stent placement, EUS-GJ using LAMS can be considered in management of MGOO.

Figure 1. Endoscopic ultrasound-guided gastrojejunostomy (EUS-GJ) using lumen-apposing metal stent. (A) Follow-up endoscopic image showing well placement of LAMS at low body of stomach. (B) Endoscopic image showing Jejunal wall inspected through the LAMS



Pearls of SGI Case Conference

Endoscopic rescue of dysfunction of EUS-guided jejuno-jejunostomy for relief of malignant afferent loop syndrome

Jung-Chun Lin

Division of Gastroenterology and Hepatology, Department of Internal Medicine, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan

A 54-year-old man who had undergone Roux-en-Y reconstruction after pancreaticoduodenectomy for adenocarcinoma of pancreatic head 18 months ago presented with a one-week history of fever and progressively painless jaundice. Laboratory testing showed a bilirubin level of 3.0 mg per deciliter (normal value, < 1.2 mg/dL), an alkaline phosphatase level of 347 U per liter (normal value, <140 U/L), a gamma-glutamyl transferase level of 983 U per liter (normal value, < 38 U/L), and a lipase level of 403 U per liter (normal value, <160 U/L). Blood culture yielded Escherichia coli. The computed tomographic scan magnetic resonance imaging of the abdomen showed enhanced tumor recurrence with a grossly dilated afferent loop of jejunum together with dilatation of the intrahepatic bile duct and pancreatic duct. A diagnosis of malignant afferent loop syndrome was made. Endoscopic ultrasound (EUS)-guided jejuno-jejunostomy was performed, resulting in marked improvement. Unfortunately, the jejuno-jejunostomy was dysfunction because of tumor progression-related dislocation of lumen-apposing metal stent 11 months later. EUS-guided hepaticogastrostomy was performed to rescue this unexpected event.

Successful embolization of afferent loop ectopic varices with quick soluble gelfoam and NBCA via mesenteric venous approach

Gun Ha Kim

Department of Radiology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Here, we report the case of a 71-year-old man who presented with hematochezia/melena for 2 months with a history PPPD due to pancreatic cancer and had the recurrent tumor at PJ anastomosis site with tumor thrombus involving SMV and main PV. Esophagogastroduodenoscopy revealed ectopic varices on afferent loop anastomosis site. Enhanced CT images showed no evidence of active bleeding but engorged varices in the afferent loop anastomosis. Endoscopic variceal ligation was performed but the patient had persistent hematochezia. Thus, endovascular embolization was requested. The patient had thin intrahepatic portal vein and transhepatic retrograde approach was not possible. The patient had prominent mesenteric vein and antegrade approach was applied. After successful negotiation of very tortuous mesenteric vein with a microcatheter, embolization of the ectopic varix was performed with quick soluble gelfoam first to prevent further NBCA embolization into intrahepatic portal vein. After embolization with 700-1000 um quick soluble gelfoam, NBCA embolization was done successfully. Completion venography showed much reduced varices visualization with preserved PV flow. The symptom was relieved after the treatment and the patient was discharged.

Pearls of SGI Case Conference

Balloon-occluded retrograde abdominal lymphangiography and embolization for refractory postoperative chylous ascites: Two cases

Yozo Sato[1], Kiyoshi Mtsueda[1], Takeshi Wada[1], Takashi Akiyoshi[2], Toshiya Nagasaki[2]

1. Department of Diagnostic Ultrasound & Interventional Radiology, Cancer Institute Hospital of Japanese Foundation for Cancer Research, Tokyo, Japan
2. Department of Gastroenterological Surgery, Cancer Institute Hospital of Japanese Foundation for Cancer Research

Owing to the recent advancements in lymphatic intervention, postoperative chylothorax can be treated by less-invasive procedure, such as thoracic duct embolization. However, chylous ascites is still a challenging condition to treat because of complex anatomy. Herein, two cases of balloon-occluded retrograde abdominal lymphangiography and embolization for refractory postoperative chylous ascites were described.

Case 1: A 82-year-old female with advanced rectal cancer underwent low anterior resection with para-aortic lymph nodes dissection. After surgery, massive chylous ascites refractory to conservative treatment was continued. Intranodal lymphangiography revealed the major lymphatic leakage at left para-aortic lymph nodes region. Hence retrograde abdominal lymphangiography was attempted. Angiographic catheter via the brachial approach was inserted to the orifice of venous angle and microballoon catheter was advanced to the left lumber trunk. Balloon-occluded retrograde lymphangiography clearly revealed the leakage point and subsequently, glue embolization using the mixture of NBCA and lipiodol was performed. After embolization, chylous ascites was markedly decreased and the patient was discharged on postoperative day 91.

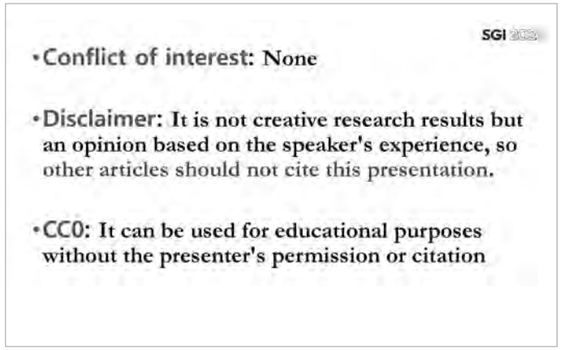
Case 2: A 79-year-old female with rectal melanoma underwent abdominoperineal resection with para-aortic lymph nodes dissection. After surgery, massive chylous ascites was continued. Intranodal lymphangiography revealed the lymphatic leakage at left para-aortic lymph nodes region. Although retrograde abdominal lymphangiography was attempted, massive thrombus formation was observed in left subclavian vein due to peripherally inserted central venous catheter insertion. As an alternative treatment, intranodal glue embolization was performed. However, chylous ascites was continued. Hence, after anticoagulant therapy, balloon-occluded retrograde lymphangiography and glue embolization was performed. After embolization, chylous ascites was markedly decreased and the patient was discharged on postoperative day 123.

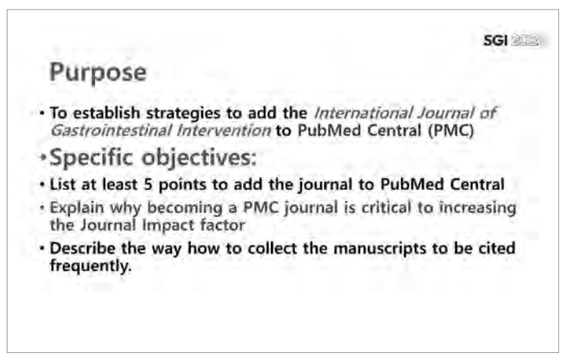
Editorial Forum

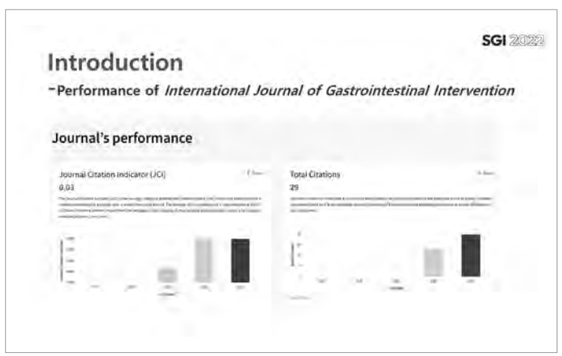
How to increase the journal impact factor

Sun Huh

Department of Parasitology, Hallym University, Korea







Why is the citation frequency low?

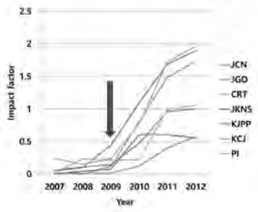


Fig 1. Chronological change in the impact factor of 7 non-Medline journals from Korea indexed in PubMed Central from 2007 to 2012. JCN, Journal of Clinical Neurology; JGO, Journal of Gynecologic Oncology; CRT, Cancer Research and Treatment; JKNS, Journal of the Korean Neurosurgical Society; KJPP, Korean Journal of Physiology and Pharmacology; KCJ, Korean Circulation Journal; PI, Psychiatry Investigation.

NLM Review Summary (June 3, 2021)

Article quality is inconsistent.

The concerns with the scientific and editorial quality include:

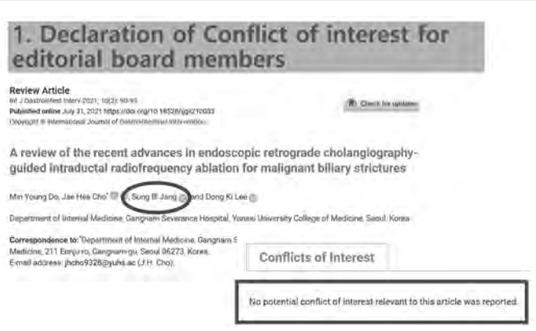
- **Concerns with the design and execution of some research studies, including study aims that were not clearly stated and/or with adequate rationale, and study designs that were not robust**
- **Discussions that were not critical and comprehensive, and methods that were not described in sufficient detail to enable reproducibility.**
- **Editorial issues, including grammar errors and typos, and problems with some figures and tables (redundant data, lack of annotation, etc.).**
- **A paucity of recent literature in the reference sections of some articles.**

NLM Review Summary (2018)

- **How submissions from editorial board members are processed in order to minimize bias.**

- **What should be prepared for the next application in 2023?**

1. Declaration of Conflict of interest for editorial board members



Review Article

Int J Gastrointest Interv 2021; 10(3): 93-95

Published online July 31, 2021 https://doi.org/10.18528/ijgii210033

Copyright © International Journal of Gastrointestinal Intervention

A review of the recent advances in endoscopic retrograde cholangiography-guided intraductal radiofrequency ablation for malignant biliary strictures

Min Young Do, Jae Hee Cho, Sung Ill Jang and Dong Ki Lee

Department of Internal Medicine, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Correspondence to: Department of Internal Medicine, Gangnam Severance Hospital, Yonsei University College of Medicine, 211 Eonju-ro, Gangnam-gu, Seoul 06273, Korea.
E-mail address: jhcho9328@yuhs.ac (J.H. Cho).

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

suggestion>

- Conflict of Interest
- Sung Ill Jang has been an editorial board member since [2020], but he does not involved in the peer review process. **Otherwise, no potential conflict of interest relevant to this article was reported.**

2. Add the study design and the country name where the study was performed

- Example)randomized controlled study, cohort study, case-control study, crossectional observational study, descriptive study, systematic review, narrative review, case report
- **Endoscopic ultrasound-guided tissue acquisition: Needle types, technical issues, and sample handling**
- Suggestion> **Needle types, technical issues, and sample handling for endoscopic ultrasound-guided tissue acquisition:** a narrative review
- **Portal and hepatic vein thrombosis after transjugular intrahepatic portosystemic shunt: Incidence in follow-up imaging and clinical implications**
- Suggestion> **Incidence and clinical outcomes of portal and hepatic vein thrombosis on imaging after transjugular intrahepatic portosystemic shunt** in the United States: a retrospective cohort study

3. Write the Ethics statement subheading at the Methods section

- **IRB, Informed consent**

Safety and efficacy of esophageal stents for esophageal anastomotic strictures: A 10-year single-center experience

Sundus Bilal[1], Saad Muhammad Saeed, Zeeshan Siddique, Muhammad Saqib, Shahana Shahid, and Muhammad Aasim Yusuf

from 2009 to 2019 were retrieved. Institutional review board exemption was formally granted, in view of the retrospective nature of the study.

Suggestion>

***Ethics statement*: IRB exemption was formally granted. (IRB No. is recommended to be mentioned although it is exempted)**

4. Reporting guidelines should be mentioned according to the study design

Systematic review of 12 years of thermal ablative therapies of non-resectable colorectal cancer liver metastases

Sameh Saif[1,2,*], Ania Z. Kielar[1], and Matthew McInnes[1]

The study protocol was not registered. No funding source is declared. We used the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement to guide reporting of this study.[3]

Long-term outcomes of surgery for oesophageal achalasia

Zi Qin Ng[1,2,*], Brendan Murphy[1], Simon Edmunds[1], Mark Whitby[1], Jih Huei Tan[2], and Stephen Archer[2]

a case control study →STROBE statement

5. Description of Discussion section

Add subheadings as follows:

- **Key results**
- Interpretation
- Comparison with previous studies
- **Limitations**
- **Suggestions for further studies**
- Generalizability
- **Conclusion →**Answer to research question

6. Cite references within 5 year-old

- **If any references were published before 5 years, it should be discussed with an editor.**
- **Cite only critical references to reach the conclusion.**
- **Clarify it in the Instruction to authors.**

7. The legend for Tables and Figures should be more precisely explained

Table 2. Adverse Events Reported in Previous Studies

Author (year)	Number	Ablative agent	Adverse event Rate (%)	Details (n)	Mild to moderate	Severe
EUS-guided ethanol ablation						
Gan et al[10] (2005)	23	E	0		0	0
DiMaio et al[12] (2011)	13	E	8	Abdominal pain (1)	1	0
Dalliol et al[13] (2012)	13	E	0		0	0

→ Table 2 . Adverse events reported in previous studies related to the endoscopic ultrasound-guided ablation therapy for pancreatic cystic lesions

8. Reproducibility: **Adoption of mandatory data sharing policy**

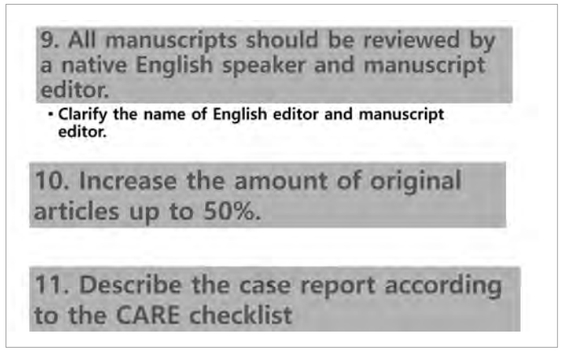
Data availability

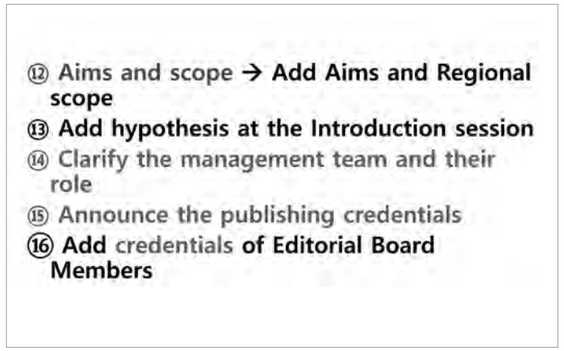
Data files are available from Harvard Dataverse, https://doi.org/10.7910/DVN/RBQHFT.

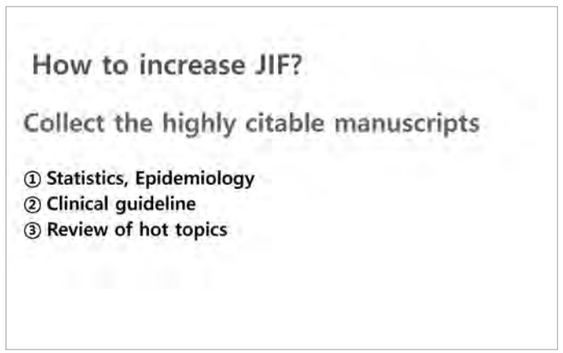
Dataset 1. Participants' response data to the survey on the awareness of environmental control, the ability to remember educational content, the assessment of intent to act, and their satisfaction with virtual reality.

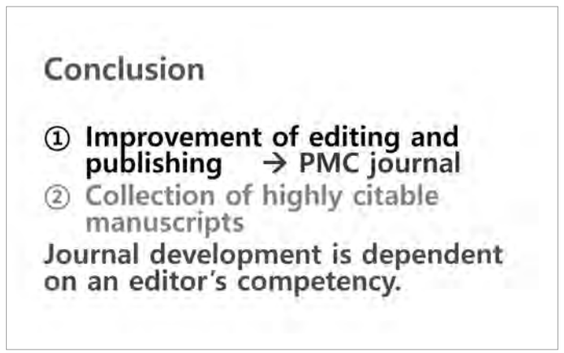
HARVARD

Environmental management education using immersive virtual reality in asthmatic children in Korea: a randomized controlled study (secondary publication)









Editorial Forum

Recent ethical issues on publication

Dong Soo Han

Hanyang University Guri Hospital, Korea

Publication ethics is a key for the scientific integrity. It makes better scientific community. Authors, editors, and reviewers are expected to be aware of, and comply with, best practice in publication ethics. Journals should have a clearly described process for handling allegations. This COPE guide is a comprehensive toolkit that explains expected ethical practices in scholarly publishing, and valuable resources for editorial offices to develop their codes of ethical conduct and practice. I would like to point recent issues of publication ethics which reviewed in ethic committee of KAMJE (Korean Association for Medical Journal Editors).

Editorial Forum

Do's and Don'ts when writing a paper for a journal

Peter D. Siersema

Radboud University Medical Center, The Netherlands

Educational Background

1972-1978 - High school, Erasmus College, Zoetermeer The Netherlands
1981- Research elective Immunology, Dept. of Experimental Pathology, St. Mary's Hospital, London, UK
1978-1981 - Bachelor in Medicine, Erasmus University Rotterdam
1981-1985 - Master in Medicine, with Honors, Erasmus University Rotterdam
1985-1990 - Resident Internal Medicine, Dept. of Internal Medicine II, University Hospital Rotterdam-Dijkzigt
1986-1987 - Fellowship Internal Medicine, Dept. of Medicine, Charing Cross Hospital, London, UK
1990-1994 - Resident Gastroenterology, Dept. of Internal Medicine II, University Hospital Rotterdam-Dijkzigt
1993 - PhD-thesis, Erasmus University Rotterdam (Title: The Liver in Uroporphyria)

Professional Career

2001-2007 - Associate Professor, Erasmus MC University Medical Center Rotterdam
2002-2003 - Visiting Professor, Division of GI, Stanford University School of Medicine, Palo Alto, USA
2003-2007 - Chief, GI Endoscopy Unit, Dept. of Gastroenterology & Hepatology, Erasmus MC Rotterdam
2007-2014 - Head, Gastroenterology Fellow Program, University Medical Center Utrecht
2007-2015 - Chair, Dept. of Gastroenterology & Hepatology, University Medical Center Utrecht
2007-2015 - Professor of Gastroenterology, University Medical Center Utrecht
2016 - Visiting Professor, Institute of Digestive Disease, The Chinese University of Hong Kong, Hong Kong, China
2016 - Honorary Professor, Changhai Hospital, Second Military Medical University, Shanghai, China
2016 - Professor of Endoscopic Gastrointestinal Oncology, Radboud University Medical Center, Nijmegen
2019 - Chief, GI Endoscopy Center, Radboud University Medical Center, Nijmegen

Other professional activities:

2013 - Editor-in-Chief, Endoscopy
2017- Section Editor, Endoscopy section of Current Treatment Options in Gastroenterology
2019 - Councilor, Governing Board European Society of Gastrointestinal Endoscopy (ESGE)
2019 - Councilor, European Society for Diseases of the Esophagus (ESDE)
2021- Chair, Committee Dutch Guidelines on "Diagnosis and Treatment of Esophageal and Gastric Cancer"

Research Field

- Pre-malignant and malignant diseases of the GI tract, especially Barrett's esophagus and esophageal cancer
- Diagnostic and therapeutic endoscopy
- Benign and malignant stricture management
- Innovations in diagnostics and endoscopy: new devices, artificial intelligence, volatile organic compounds in breath

Papers, Books, etc. presented or published by your name

(topic title, year, conference name or presenting books)

PUBLICATIONS: 1.053
TOTAL TIMES CITED: 21.610
H-INDEX: 74

Full publication list: https://pubmed.ncbi.nlm.nih.gov/?term=siersema&size=50

Top papers 2019-2020

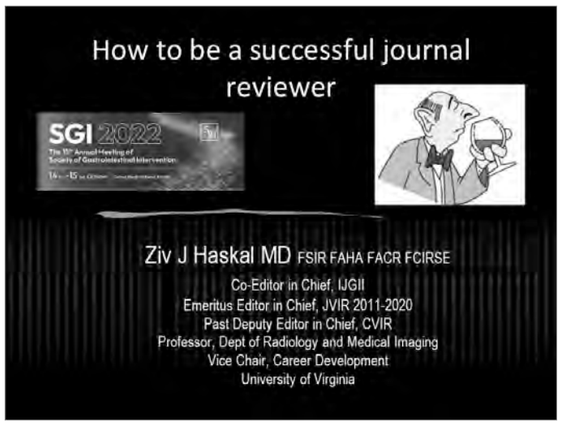
1. **Siersema PD**. How to approach a patient with refractory or recurrent benign esophageal stricture. Gastroenterology 2019; 156: 7-10.
2. Peters Y, ..., **Siersema PD**. Incidence of progression of persistent non-dysplastic Barrett's esophagus to malignancy. Clin Gastroenterol Hepatol 2019; 17: 869-77.
3. Peters Y, ..., **Siersema PD**. Barrett oesophagus. Nat Rev Dis Primers 2019; 5: 35.
4. Gralnek IM, ..., **Siersema PD**, Rösch T. Right-sided location not associated with missed colorectal adenomas in an individual-level reanalysis of tandem colonoscopy studies. Gastroenterology 2019; 157: 660-671.
5. **Săftoiu A, ..., Siersema PD, ..., Ponchon T. Role of gastrointestinal endoscopy in the screening of digestive tract cancers in Europe: ESGE Position Statement. Endoscopy 2020**; 52: 293–304.
6. van Keulen KE, ..., **Siersema PD**. Volatile organic compounds in breath can serve as a non-invasive diagnostic biomarker for the detection of advanced adenomas and colorectal cancer. Aliment Pharmacol Ther 2020; 51: 334-46.
7. Jeene PM, ..., **Siersema PD**, Hulshof MC. Short course external beam radiotherapy versus brachytherapy for palliation of dysphagia in oesophageal cancer: a matched comparison of two prospective trials. J Thorac Oncol 2020; 15: 1361-8.
8. Peters Y, ..., **Siersema PD**. Detection of Barrett's oesophagus through exhaled breath using an electronic nose device. Gut 2020; 69: 116; 69: 1169-72.

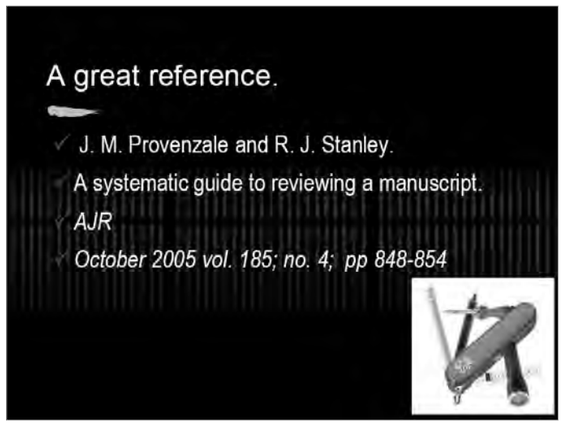
Editorial Forum

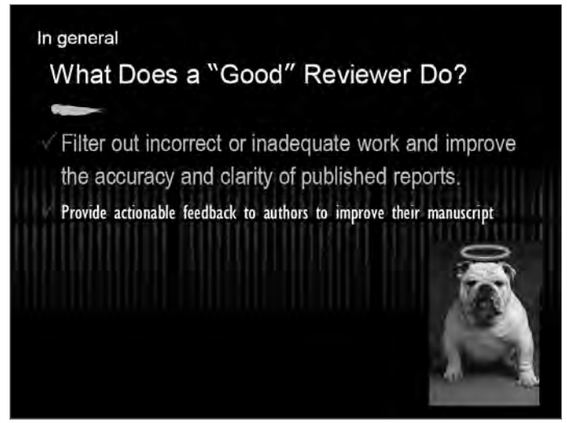
How to be a successful journal reviewer

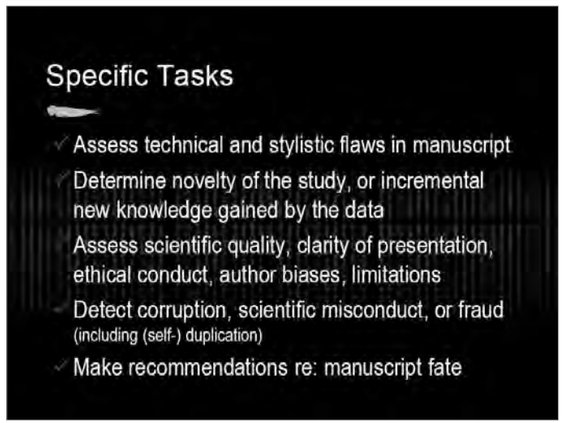
Ziv J. Haskal

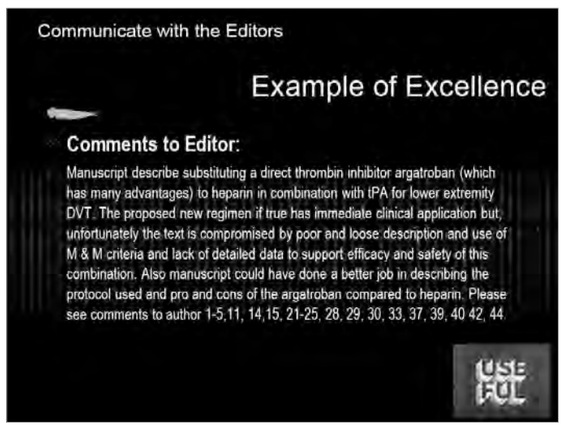
University of Virginia, USA

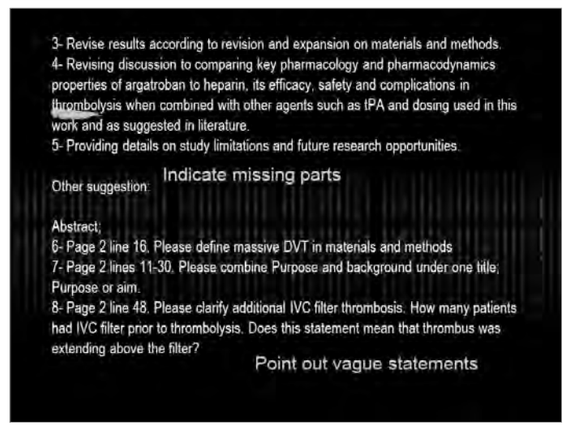


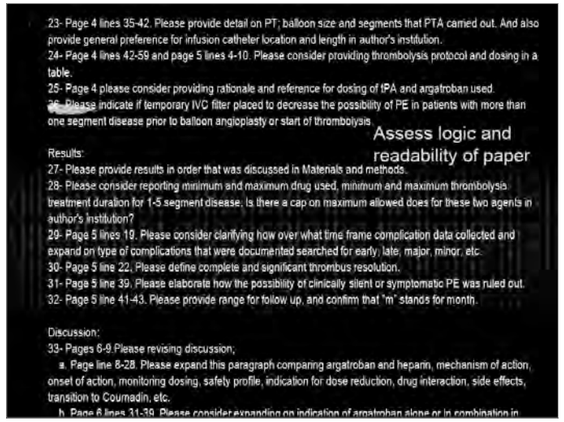


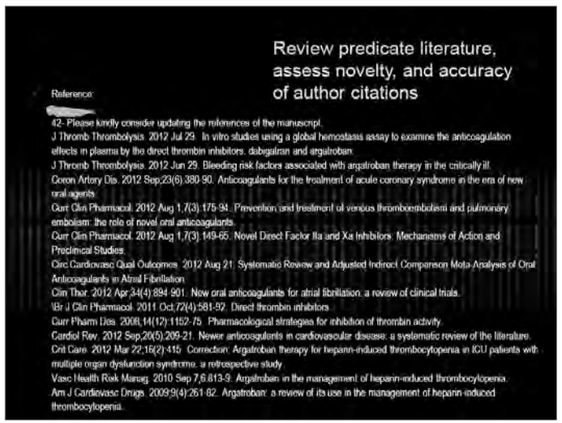


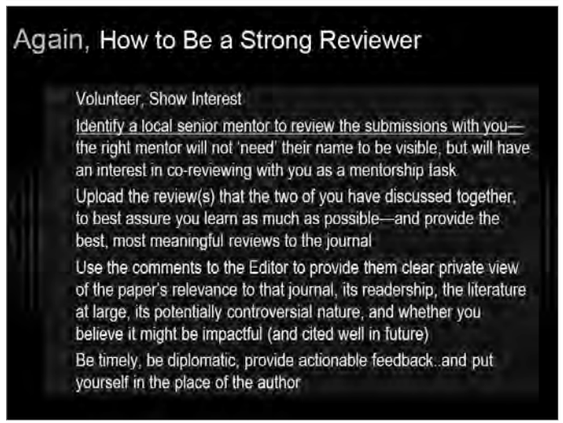


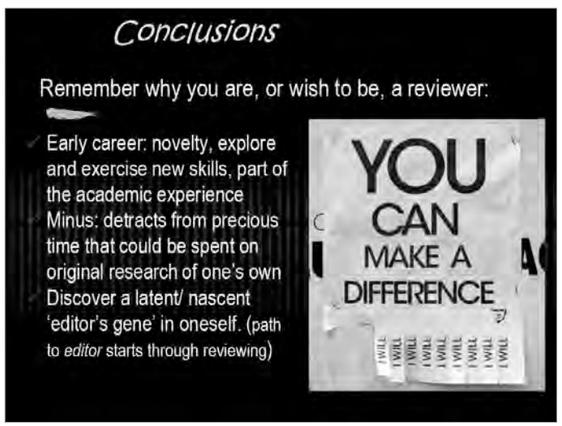












Society of Gastrointestinal Intervention

ORAL PRESENTATION

Plenary Free Paper Session

SGI-OP1

Endoscopic resection of gastric gastrointestinal stromal tumor: The role of clip-and-cut endoscopic full-thickness resection

Yuri Kim[1], Ji Yong Ahn[1], Hwoon-Yong Jung[1], Seokin Kang[2], Ho June Song[1], Kee Don Choi[1], Do Hoon Kim[1], Jeong Hoon Lee[1], Young Soo Park[3]

[1]Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, [2]Department of Internal Medicine, Ilsan Paik Hospital, Inje University College of Medicine, Goyang, Korea, [3]Department of Pathology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Background / aims: To overcome the technical limitations of classic endoscopic resection for gastric gastrointestinal stromal tumors (GISTs), various methods have been developed. We analyzed the results of endoscopic submucosal dissection (ESD) and a modified endoscopic full-thickness resection (EFTR) method using clip- and-cut procedure (clip-and-cut EFTR, cc-EFTR) for gastric GISTs to identify the role and its feasibility of cc-EFTR.

Methods: The medical records of 83 patients diagnosed with GISTs after ER in 2005–2021 were retrospectively reviewed. ESD and cc- EFTR were performed in 51 and 32 patients. The clinical characteristics and outcomes were analyzed.

Results: The GISTs were mainly found in the upper third of stomach for ESD (52.9%) and cc-EFTR (90.6%). In cc-EFTR group, there was a tendency that the most of GISTs were in deep muscularis propria or serosal layer (96.9%) compared to ESD group (45.1%). The R0 resection rates were 51.0% in ESD and 84.4% in cc-EFTR group, respectively. Perforation during procedure was frequently found in cc-EFTR group (25.5% vs. 68.8%), however only three patients were progressed to peritonitis. Seven cases (8.4%) required surgical treatment (6 ESD, 1 cc-EFTR) due to residual tumor (n=5), and post-procedure adverse events (n=2). No R0 or R1 resected cases experienced recurrence during the median 14-month follow-up except for one patient in ESD group.

Conclusions: cc-EFTR showed higher R0 resection rate and was useful and safe in removing small gastric GISTs.

Keywords: Gastrointestinal stromal tumor, Endoscopic full thickness resection, Endoscopic submucosal dissection, Surgical endsocopy

SGI-OP2

3-year evaluation of a new regional protocol for post-radiation strictures after oesophageal cancer treatment

Hans-Ulrich Laasch[2], Owen T. Dickinson[2], Philip Borg[1], Ganesh Radhakrishna[3], Derek W. Edwards[2]

[1]Department of Radiology, The Christie, Manchester, UK, [2]Minnova, Medical Foundation, Wilmslow, United Kingdom, [3]Department of Clinical Oncology, The Christie, Manchester, UK

Background / aims: To assess the safety and efficacy of a new regional consensus protocol for treating dysphagia from radiation-induced strictures following concurrent chemo-radiotherapy for oesophageal carcinoma. To advance national guidelines, which do not specify a dilatation algorithm.

Methods: The radiology department of a specialist cancer centre was identified by the multi-disciplinary team to deliver a structured dilatation protocol. Tumour recurrence was ruled out by CT and biopsy prior to referral. Procedures were performed under combined endoscopic/fluoroscopic control and procedural sedation administered by the IR nurses using bispectral index (BIS) EEG-guidance. Balloon-dilatation was started at 9/12/15mm for filiform/complex/simple strictures respectively and repeated with 3mm increments every 1-3 weeks to 18-20mm. If no sustained improvement was achieved, steroid injections were added and temporary stenting (metal then biodegradable) offered. IRB approval was granted for this new service in 2019.

Results: 23 patients (9 male, 14 female) with a median dysphagia grade of 3 (2-4) received a total of 131 procedures. Median number of dilatations was 6 (2-27). 5 stents (2 biodegradable) were placed in 3 patients. Perforation occurred after 1 procedure (0.8%), which could be managed conservatively. 9 patients died: 5 developed local recurrence, 2 metastatic disease. Two died from unrelated causes. 14 disease-free patients improved to dysphagia 1° (1-2), IDDSI 6 (6-7). All 5 patients with feeding tubes had them removed. To date 5 patients have achieved treatment-free intervals exceeding 9 months.

Conclusions: Good clinical outcomes and high patient satisfaction support a centralised multi-disciplinary service for radiation strictures. The repeat endoscopic surveillance had a high detection rate for early cancer recurrence. Patients initially require frequent repeat procedures to achieve a good outcome. Tight scheduling and good patient counselling is essential.

Keywords: Dilatation, Radiation stricture, Stricture management

SGI-OP3

Results of the new technique of endoscopic treatment of patients with Zenker's diverticulum. More than 230 cases Single Center experience

Ivan Nedoluzhko, Ivan Pavlov, Kirill Shishin, Lada Shumkina Yuri

Operative Endoscopy, Moscow Clinicalscientific Center N.a. Loginov A.s., Moscow, Russian Federation

Background / aims: Endoscopic techniques are currently a priority in treatment patients with Zenker's diverticulum. Nevertheless, standard endoscopic treatment is associated with an increased number of disease relapses up to 20%. On the one hand, the tunnel technique allows to perform the adequate volume of myotomy regardless of the diverticulum size. On the other hand, the residual cavity of the diverticulum can be left, which determines the potential risk of recurrence in the case of a large diverticulum. Therefore we have developed a novel technique that combines all the advantages of standard and tunnel operations

Methods: In the period from July 2014 to June 2022, endoscopic operations for ZD were performed in 170 patients. The average diverticulum size was 2.8 cm (0.5 to 7 cm). 34 patients were operated using the standard technique and 38 patients using the tunnel technique. The average time of surgery in the two groups was 40 minutes. 167 patients were operated on using the combined technique. The average time of surgery was 35 minutes. Upper esophageal myotomy up to 3-7 cm, depending on the size of the diverticulum, was performed in addition to tunnel and combined techniques

Results: All patients underwent EGD 3 and 12 months after surgery, followed by annual endoscopic control. In the presence of complaints, an additional X-ray examination was performed. Over the entire follow-up period, 4 (11.8%) patients operated by the standard technique in the postoperative period revealed a relapse of clinical manifestations of the disease, which required a total of 7 (17.1%) repeated operations. After tunnel and combined operations, no relapse of the disease was encountered. No complications in the postoperative period were observed in all three groups

Conclusions: The study has shown the high efficiency of combined interventions in the treatment of ZD. Therefore this technique can be used regardless of the size of diverticulum

Keywords: ZENKER DIVERTICULUM

SGI-OP4

Outcomes of percutaneously inserted lumen apposing metal stents and double J plastic stents used to treat pancreatic collections

Tim Fotheringham[1], Stefan Lam[2], Diana Velazquez-Pimentel[1], Mohammed Akhtar[1], Ajit Abrahams[1]

[1]Interventional Radiology, The Royal London Hospital, Barts Health Nhs Trust, London, United Kingdom, [2]Medicine, Watford General Hospital, Watford, UK

Background / aims: Pancreatitis can cause symptomatic or infected pancreatic collections requiring treatment. Collections can be treated using endoscopic cystogastrostomy, percutaneous drainage and may require necrosectomy. Endoscopic cystogastrostomy can be performed using double J stents (DJS) and lumen apposing metal stents (LAMS). Cystogastrostomy can also be performed percutaneously under fluoroscopic guidance. The aim of the study was to compare percutaneously treated pancreatic collections using either LAMS or DJS.

Methods: Retrospective review of patients treated with percutaneously placed of DJS and LAMS between 2012 and 2021. Data was collected using electronic patient records. All patients had transgastric percutaneous placement with gastropexy sutures with ultrasound and fluoroscopic guidance. The LAMS group had 14mm NAGI stents (Taewong, South Korea) inserted via an 11 F sheath and the LAMS was removed endoscopically. DJS group has 10F 3cm stents Solus (Cook Medical) inserted and the DJS passed enterally.

Results: 45 patients were identified during the study period, mean age in years =44.8 (range 20-74), M:F ratio 26:19. 18 patients had a LAMS inserted and 27 patients had DJS. Follow up period in months, mean 37.0 (range 3.3-86.5). 8 patients had pseudocysts, 23 had walled of necrosis and 14 had infected collections. Technical success was achieved in 44/45 (97.8%) with one DJS requiring repositioning. No necrosectomies were required. Infection requiring percutaneous drainage was seen in 6 patients (22.2%) in the DJS group. In the LAMS group, one patient required a drain for a leak due to failed gastropexy sutures, another patient had delayed retrieval and required embolisation for haemorrhage. No recurrence of the collection seen in the LAMS group, additional cystogastrostomy was required in 10 patients (37.0%) in the DJS group.

Conclusions: LAMS and DJS can be inserted percutaneously with a high technical success rate. LAMS was associated with fewer complications and was more effective than DJS in resolving pancreatic collections.

Keywords: Pancreatic collection, Percutaneous insertion, Lumen apposing metal stent

SGI-OP5

Successful intubation using cap-assisted colonoscope for endoscopic retrograde cholangiopancreatography in patients undergoing Roux-en-Y reconstruction

Kyong Joo Lee, Se Woo Park, Dong Hee Koh, Jin Lee

Hallym University Dongtan Sacred Heart Hospital, Hallym University College of Medicine, Division of Gastroenterology, Department of Internal Medicine, Hwaseong, Korea

Background / aims: Endoscopic retrograde cholangiopancreatography (ERCP) is challenging in patients undergoing Roux-en-Y (REY) reconstruction, and though balloon-assisted enteroscopy has been established as the first-line treatment, it is not always available in terms of equipment and expertise. This study aimed to evaluate the feasibility of using a cap-assisted colonoscope as the primary approach for ERCP in REY reconstruction.

Methods: This retrospective study included 47 patients with REY who underwent ERCP using a cap-assisted colonoscope between January 2016 and February 2022. The primary outcome was intubation success for ERCP using a cap-assisted colonoscope during REY reconstruction. The secondary outcomes were cannulation success, procedure-related adverse events, and variables affecting successful intubation.

Results: Comparing side-to-side jejunojejunostomy (SS-JJ) and side-to-end jejunojejunostomy (SE-JJ) groups, the intubation success rate using cap-assisted colonoscope in the SS-JJ group was higher than that in the SE-JJ group (34 of 38 [89.5%] vs. 1 of 9 [11.1%], $p < 0.001$). Successful intubation was achieved in 37 (97.4%) and 8 (88.9%) patients in the SS-JJ and SE-JJ groups, respectively, after applying the rescue technique using a balloon-assisted enteroscope for failed ERCP using only a colonoscope. No perforation occurred. Multivariable analysis showed that SS-JJ was a predictive factor for successful intubation (odds ratio [95% confidence interval]=37.06 [3.91–925.56], $p = 0.005$).

Conclusions: The use of a cap-assisted colonoscope can be a primary approach for ERCP in patients undergoing REY reconstruction. Anatomically, SS-JJ can facilitate easy and accurate identification of the afferent limb and a highly successful ERCP using a cap-assisted colonoscope.

Keywords: Endoscopic retrograde cholangiopancreatography, Surgically altered anatomy, Roux-en-Y, Jejuno-jejunostomy, Colonoscope

SGI-OP6

Percutaneous transhepatic papillary balloon dilation versus endoscopic retrograde cholangiopancreatography for common bile duct Stones: A multicenter prospective study

Bin Liu[1], Junji Ma[2], Shengyong Li[3], Changhai Li[4], Hongjun Qi[5], Dingfang Nian[6], Chunhui Yin[7], Jingrun Zhu[8], Changjun Wang[9], Yunming Jia[10], Tao Jiang[11], Jiliang Lu[12], Lijun Wang[13], Dongfeng Shen[14], Xiangqian Hou[15], Dianxue Li[16], Zhiyong Zhang[17], Honglei Wu[18], Tao Yu[19], Yuliang Li[1]

[1]Department of Interventional Medicine, The Second Hospital of Shandong University, Jinan, China, [2]Department of Interventional Medicine, Jinxiang People's Hospital, Jining, China, [3]Department of Hepatobiliary Surgery, Weihai Municipal Hospital, Weihai, China, [4]Department of Interventional Medicine, Zibo Integrated Traditional Chinese and Western Medicine Hospital, Zibo, China, [5]Department of General Surgery, Dezhou Municipal Hospital, Dezhou, China, [6]Department of Interventional Medicine, Qingdao Hiser Hospital, Qingdao, China, [7]Department of Interventional Medicine, Weifang Traditional Chinese Medicine Hospital, Weifang, China, [8]Department of Interventional Medicine, Linyi Traditional Chinese Medicine Hospital, Linyi, China, [9]Department of Radiology, Jiyang People's Hospital, Jinan, China, [10]Department of Interventional Medicine, Linzi District People's Hospital, Zibo, China, [11]Department of Interventional Medicine, Central Hospital of Xinwen Mining Group, Taian, China, [12]Department of Interventional Medicine, Yiyuan County People's Hospital, Zibo, China, [13]Department of Interventional Medicine, Huantai County People's Hospital, Zibo, China, [14]Department of Interventional Medicine, Shanxi Traditional Chinese Medicine Hospital, Taiyuan, China, [15]Department of General Surgery, Dezhou People's Hospital, Dezhou, China, [16]Department of Interventional Medicine, Laiwu Traditional Chinese Medicine Hospital, Jinan, China, [17]Department of Interventional Medicine, Linshu People's Hospital, Linyi, China, [18]Digestive Department, The Second Hospital of Shandong University, Jinan, China, [19]Digestive Department, Qilu Hospital of Shandong University, Jinan, China

Background / aims: Endoscopic retrograde cholangiopancreatography (ERCP) is recommended by major guidelines for the removal of common bile duct (CBD) stones, but it is technically challenging in patients with low cardiopulmonary reserve and anatomical abnormalities of the upper gastrointestinal (GI) tract. This study was conducted to compare percutaneous transhepatic papillary balloon dilation (PTPBD) versus ERCP for CBD stones.

Methods: Participants with 1-3 CBD stones (largest stone at <=30 mm) without intrahepatic bile duct or gallbladder stones were eligible for this prospective cohort study. PTPBD was recommended to participants with low cardiopulmonary reserve ordefinitive anatomical abnormalities of the upper GI tract. Otherwise, both procedures were offered without preference. Follow-up, including abdominal CT, was conducted at 1st week, 1st, 3rd and 6th month, and every 6 months thereafter. Ultrasound and MR cholangiopancreatography were conducted if recurrence could not be confirmed with CT. Technical success rate was the primary outcome.

Results: A total of 533 participants were included: 360 receiving PTPBD (median age: 76.5 years, IQR: 64-82, 163 men) and 173 receiving ERCP (median age: 66 years, IQR: 58-74, 94 men). The technical success rate was 98.6% (355/360) in PTPBD group and 96.5% (167/173) in ERCP group (relative risk 1.04, 1-sided 95%CI 1.00 to +∞; P=0.03). The incidence of overall complications was 3.6% (13/360) in PTPBD group and 7.5% (13/173) in ERCP group (relative risk 0.29, 95%CI 0.13 to 0.65; P=0.003). PTPBD group had a longer fluoroscopy time and a higher radiation exposure, with an adjusted difference of 31.2 min (95% CI 24.9 to 37.2) and 406.3 mGy (95% CI 322.8 to 489.9), respectively. A propensity score matching analysis (120 participants in each group) yielded similar results in technical success rate and complications.

Conclusions: In comparison to ERCP, PTPBD has a higher technical success rate, fewer perioperative complications, but a higher radiation exposure.

Keywords: Common bile duct calculi, Oddi's Sphincter, Endoscopy, Dilation

SGI-OP7

The role of direct peroral cholangioscopy for the detection of intraductal neoplasms of the bile duct

Il Sang Shin[1], Jong Ho Moon[1], Yun Nah Lee[1], Jun Chul Chung[2], Hee Kyung Kim[3], Tae Hoon Lee[1], Jae Kook Yang[1], Sang-Woo Cha[1], Young Deok Cho[1], Sang-Heum Park[1]

[1]Digestive Disease Center and Research Institute, Department of Internal Medicine, Soon Chun Hyang University School of Medicine, Bucheon, Cheonan, and Seoul, Korea, [2]Digestive Disease Center and Research Institute, Department of Surgery, Soon Chun Hyang University School of Medicine, Bucheon, Korea, [3]Digestive Disease Center and Research Institute, Department of Pathology, Soon Chun Hyang University School of Medicine, Bucheon, Korea

Background / aims: Since indirect diagnostic modalities have been unsatisfactory for detecting intraductal neoplasms of the bile duct (IN-B), direct peroral cholangioscopy (POC) using an ultraslim endoscope can be a possible alternative. Here, we evaluated the efficacy of direct POC for the detection of IN-B.

Methods: Consecutive 471 patients who underwent direct POC were enrolled between April 2008 and July 2020. Intraductal superficial lesions of the bile duct (ISL-B) were investigated under POC using narrow-band imaging (NBI), and correlated to histologic findings after POC guided forceps biopsy (POC-FB) or surgery. The detection rate of IN-B, technical success of POC and POC-FB, and adverse events were analyzed.

Results: Direct POC was successful in 458 of 471 patients (97.2%). Mild cholangitis developed in 4 patients (0.8%), which was resolved conservatively. Of the 458 successfully performed POCs, 133 patients (29.0%) exhibited ISL-B. The technical success of POC-FB was 94.0% (125/133). Of the 125 successfully performed POC-FBs, 41.6% (52/125) exhibited IN-B. Curative-intent surgery was performed in 21/52 (40.4%) patients with IN-B.

Conclusions: Direct POC using an ultraslim endoscope with NBI is useful for the detection of IN-B.

Keywords: Intraductal neoplasms of the bile duct, Intraductal superficial lesions of the bile duct, Peroral cholangioscopy (POC)

SGI-OP8

Safety and diagnostic accuracy of endoscopic ultrasound guided spleen biopsy in comparison with percutaneous biopsy

Junghwan Lee, Tae Jun Song, Dong Wook Oh, Do Hyun Park, Sang Soo Lee, Dong Wan Seo, Sung Koo Lee

Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul , Korea

Background / aims: Traditionally, percutaneous biopsies have been used for the diagnosis of splenic lesions. However, there are concerns about the risk of serious adverse events after percutaneous biopsy of the spleen, especially regarding major hemorrhagic complications requiring urgent splenectomy. More recently, endoscopic ultrasound (EUS)- guided biopsy has proven to be safe and effective for tissue acquisition of peripancreatic lesions and also been used for the diagnosis for splenic lesions. However, the two splenic biopsy methods have not been compared yet.

Methods: This retrospective analysis included 60 patients who underwent EUS- guided or percutaneous splenic biopsies from 2015 to 2021. The clinical outcomes and adverse events were evaluated.

Results: EUS-guided biopsy was performed in 36 patients, and percutaneous biopsy was performed in 24 patients. The sensitivity, specificity, and accuracy were 90.0%, 100%, and 96.8% in the EUS- guided biopsy group, and 92.3%, 100%, and 95.0% in the percutaneous biopsy group, respectively. Twenty-one diagnoses (35%) were malignant, and the most common malignancy was lymphoma. Major adverse events occurred in two patients in the percutaneous group, and one of the adverse events required transcatheter arterial embolization and splenectomy due to hemorrhage. No major adverse events were observed in the EUS group, and the overall adverse event rate was significantly lower in the EUS group compared with the rate in the percutaneous group (p = 0.023).

Conclusions: EUS-guided biopsies are safe and accurate diagnostic method for splenic lesions. The risk of adverse events may be lower for EUS- guided biopsies compared with that of percutaneous biopsies.

Keywords: Spleen, Endoscopic ultrasound-guided biopsy, Percutaneous biopsy

Society of
Gastrointestinal
Intervention

E-POSTER EXHIBITION

SGI-P01

Experimental study on cyanobacteria-loaded hydrogel-coated self-oxygenated 125I seed combined stent for advanced esophageal cancer

Shuting Lu, Jinhe Guo

Department of Radiology, Zhongda Hospital, Southeast University, Nanjing, Jiangsu Province, China

Background / aims: Esophageal internal irradiation stents treatment has been a widely accepted palliative treatment modality for advanced esophageal cancer with dysphagia. However, some patients with advanced esophageal cancer are radioresistant to 125I internal irradiation treatment, which impairs its suppressive and killing effects, and the recurrence rate of dysphagia after esophageal internal irradiation stents is 28%-37%. Hence, this is an urgent requirement to design a new type of esophageal internal irradiation stent with the aim of alleviating radioresistance and reducing recurrence and metastasis after treatment.

Methods: A self-oxygenated 125I seed combined stent was constructed via the self-crosslinking of cyanobacterial-loaded GelMA hydrogel on the surface of traditional 125I seed stent, and its performance (flexibility, support, and scalability) was evaluated by mechanical experiments. The biosafety of combined stent was confirmed via hemolysis test and animal chronic toxicity reaction. Importantly, the capability of oxygen generation was assessed at cellular level. Cell experiments assessed radiosensitivity improvement and immune activation with this 125I seed combined stent treatment. To further validate the role and mechanism of combined stent treatment, the rabbit esophageal cancer models was constructed.

Results: This self-oxygenated 125I seed combined stent with good biosafety has better bending, compression resistance and support properties. This combined stent can control oxygen production and alleviate the tumor hypoxic microenvironment, leading to improve radiosensitivity and reshape the tumor suppressive immune microenvironment by promoting DC maturation and activating killer T cell function. Importantly, this combined stent can treat in situ esophageal cancer and inhibit its metastasis and recurrence.

Conclusions: The self-oxygenated 125I seed combined stent will endow a new function with oxygen generation in situ to the traditional 125I seed stent and will realize the 125I seed/photodynamic/immune tri-modality synergistic therapy, which can provide an important experimental basis and scientific evidence for the development of new combined stents and synergistic treatment of advanced esophageal cancer.

Keywords: Cyanobacteria, Self-oxygenated, 125I seed, Stent, Advanced esophageal cancer

SGI-P02

Endoscopic vacuum therapy for treatment gastrointestinal anastomotic leakages

Ivan Nedoluzhko, Anastasia Pyatakova, Kirill Shishin, Lada Shumkina

Operative Endoscopy, Moscow Clinical Scientific Center, Moscow, Russian Federation

Background / aims: Anastomotic leakages, associated mediastinitis and sepsis are serious complications after surgical interventions on the gastrointestinal tract. Mortality rate in case of such complications amounts up to 30%. The classical approaches to the treatment of patients by means of traditional surgical interventions lead to an increase in mortality up to 64%, which determines minimally invasive technologies as a priority. Since 2006, a new method of endoscopic vacuum therapy in management of anastomotic leaks has become available in clinical practice

Methods: From 2015 to 2021 years, anastomotic leakage was diagnosed in 13 patients. The average age was 67.5 years. Size of anastomotic perforation was ranged from 8 mm to 3 cm. The resulting complications were diagnosed on average 1-7 days after operation, which was confirmed by X-ray and endoscopic analysis

Results: A total of 60 procedures was performed: the number of replacements on average was 4 (1-7 times), the interval between procedures was 6 days (3-13 days), the duration of treatment was 13 days (1-66 days). In 10 patients, during the treatment, the defect was successfully closed (75%). In two cases, there was a lethal outcome against the background of progressive multiple organ failure due to a burdened concomitant anamnesis

Conclusions: Our experience allows us to consider endoscopic vacuum therapy as a valuable, economically justified and comparatively simple, with the appropriate skills, method of treating anastomotic leak and perforation of the gastrointestinal tract

Keywords: Leakage vacuum anastomos

SGI-P03

Endoscopic interventions in treatment of submucosal tumors in the stomach

Ivan Nedoluzhko, Irina Khvorova, Kirill Shishin, Lada Shumkina

Operative Endoscopy, Moscow Clinicalscientific Center N.a. Loginov A.s., Moscow, Russian Federation

Background / aims: Currently a laparoscopic operation is the standard treatment option in patients with submucosal tumors of the stomach. However, endoscopic technologies find their application in treatment of submucosal gastric lesions due to the improvement of an early diagnosis

Methods: 66 patients with gastric submucosal lesions were operated in Moscow Clinical Scientific Centre since 2013 until 2021. There was a significant predominance of females among patients. The average age was 59.6 years. The average size of tumor was 2.6 cm. The negative endosonografic changes such as an increase of tumor size or a change of its characteristics and clinical manifestations as well (bleeding, dysphagia, and stomach pain) were the indication for an operation. The interventions included 24 endoscopic dissections in the submucosal layer, 33 endoscopic tunnel dissections, 7 endoscopic muscle dissections, 2 full- thickness resection

Results: The average operation time was 123 minutes. No postoperative complications were encountered. According to the postoperative histological and immunohistochemical reports 28 neoplasms appeared to be gastrointestinal stromal tumours, 12 leiomyomas, 8 removed tumours were lipomas and 14 fibroinflammatory polyps. In one case the lesion turned out to be an aberrant pancreas and 2 cases – hemangioma. There were no relapses of diseases during the entire follow-up period

Conclusions: The endoscopic intraluminal operations are minimally invasive, radical and safe interventions. Minimal access significantly reduces the number of complications and a period of patients' rehabilitation after operation

Keywords: GIST Submucosal STER

SGI-P04

Endoscopic treatment for chronic radiation proctitis

Ivan Nedoluzhko[1], Elena Grishina[1], Alexandr Leontyev[2], Kirill Shishin[1], Lada Shumkina[1]

[1]Operative Endoscopy, Moscow Clinicalscientific Center N.a. Loginov A.s., Moscow, Russian Federation, [2]Coloproctology, Moscow Clinicalscientific Center N.a. Loginov A.s., Moscow, Russian Federation

Background / aims: The use of radiofrequency ablation (RFA) can be an alternative method for CRP treatment, as it takes less sessions, given the possibility to ablate a larger area during one procedure. However, at that moment, there are no long-term data on the use of this method in patients with CRP

Methods: Radiofrequency ablation of the rectal mucosa for chronic radiation proctitis was performed on 57 patients

Results: The detailed surgical technique for performing RFA of the rectal mucosa for chronic radiation proctitis is a technically feasible and safe technique in the treatment of this category of patients. The indicators of the early and long-term postoperative period demonstrate the effectiveness of this technique. RFA is an alternative technique for radiation proctitis, which, due to its technical features, can be mainly used in the treatment of patients with large lesions of the rectum, allowing the treatment of a large area with minimal risk of thermal tissue damage

Conclusions: 1. RFA is an effective method of treating patients with chronic radiation proctitis. 2. This method doesn't require multiple procedures

Keywords: Radiation proctitis RFA

SGI-P05

Fluoroscopically guided balloon dilation of esophageal stricture in Plummer–Vinson syndrome: A report of two cases

Alrashidi Ibrahim[1], Ji Hoon Shin[2]

[1]Radiology, King Salman Specialist Hospital, Hail, Saudi Arabia, [2]Radiology, Asan Medical City, Seoul, Korea

Contents: Plummer–Vinson syndrome is known as the association of dysphagia, upper esophageal web, weight loss, and iron-deficiency anemia. Esophageal dilation therapy is usually necessary to remove webs and to relieve dysphagia in order to encourage oral intake. We report two cases of Plummer–Vinson syndrome. Both patients presented with significant and longstanding dysphagia, sideropenia, and painful swallowing. Patients' esophagograms revealed the presence of tight stenosis in the high cervical esophagus. Both patients were treated with fluoroscopically guided balloon dilation and iron supplementation. These patients were followed up after the initial treatment and showed improvement of dysphagia and iron-deficiency anemia.

Keywords: Dilatation, Esophageal dysphagia, Esophageal stenosis, Iron-deficiency anemia

SGI-P06

Endoscopic treatment of esophageal injuries using vacuum therapy

Murad Gasanov, Shagen Danielyan, Peter Yartsev

Department of Endoscopy and Intraluminal Surgery, Scientific Research Institute of First Aid to Them. N.v. Sklifosovsky, Moscow, Russian Federation

Background / aims: Rupture of the esophagus is a life-threatening pathological condition with the development of purulent-septic complications with the mortality rate up to 86%. Despite the advances made in modern surgery, the treatment of patients with esophageal injuries remains one of the most topical and complex issues. In recent years, high-technology minimally invasive methods, such as endoscopic vacuum therapy (EVT) in the treatment of esophageal injuries. The effectiveness of EVT has been sufficiently studied in case of failure of esophageal anastomoses, however the application of this method in case of mechanical esophageal injuries is limited by a small series of observations, indicating the necessity of additional study. Aim: Analysis of own experience in the use of endoscopic vacuum therapy (EVT) in a comprehensive examination of patients with esophageal injuries.

Methods: We analyzed the results of treatment of 24 patients with mechanical injuries of the esophagus for the period 2019-2021. Complex treatment of patients included the use of minimally invasive technologies, including percutaneous endoscopic gastrostomy (PEG), EVT and video-assisted thoracoscopic debridement. Evaluation of the effectiveness of treatment was carried out using multislice computed tomography (MSCT), endoscopy and laboratory tests. The duration of inpatient treatment and the duration of EVT, the number of system replacements, complications and mortality were taken into account.

Results: EVT in patients with mechanical injuries of the esophagus allowed to achieve epithelialization of the esophageal defect in 21 patients (87.5%) in the form of linear scar on the site of perforation or pseudodiverticulum. Complications were noted in 4 patients (16.6%), including bleeding (2) and and esophageal stenosis in the perforation area (2). Lethal outcome was in one observation (4.2%).

Conclusions: EVT may be the method of choice in complex treatment in patients with esophageal lesions.

Keywords: Esophagus injuries, Perforation of the esophagus, Spontaneous perforation of the esophagus, Mediastinitis, Endoscopic vacuum therapy.

SGI-P07

Tumor oxygenation nanoliposome synergistic Hypoxia-Inducible-Factor-1 Inhibitor enhanced Iodine-125 seed brachytherapy for esophageal cancer

Xijuan Yao

Center of Interventional Radiology and Vascular Surgery,Department of Radiology, Zhongda Hospital,medical School,Southeast University, Nanjing, Jangsu Province, China

Background / aims: Iodine-125 (125I) brachytherapy has become one of the most effective palliative treatment options for advanced esophageal cancer. However, resistance toward 125I brachytherapy caused by pre-existing tumor hypoxia and hypoxia-induced hypoxia-inducible factor 1α (HIF-1α) signaling pathway activation represents a significant limitation in cancer treatment. To circumvent these problems, herein, we proposed an innovative strategy to alleviate radio resistance of brachytherapy by co-encapsulating catalase (CAT) and HIF-1 inhibitor-acriflavine (ACF) into the hydrophilic cavities of liposome, termed as ACF-CAT@Lipo.

Methods: The transmission electron microscopy (TEM), dynamic light scattering (DLS), and ultraviolet-visible(UV-vis) were used to detect the successful synthesis of ACF-CAT@Lipo. Flow cytometry, confocal laser scanning microscopy (CLSM), CCK-8 assay, and [Ru(dpp)3Cl]2 probes were conducted to evaluate cytotoxicity, endocytosis, and oxygen generation capability of ACF-CAT@Lipo.125I seed radiosensitive enhancement of the ACF-CAT@Lipo in vivo and in vitro were assessed via a CCK-8 analysis, Calcein-AM/PI and cellular apoptosis measurement, Immunofluorescence γ-H2AX Detection in ECA109 Cells, Cellular colony survival assay and Tumor xenograft model. In addition, the underlying mechanism of 125I particles implanted in the treatment of implanted esophageal cancer was explored through RNA sequencing studies

Results: CAT in ACF-CAT@Lipo was to catalyze endogenous oxygen production, resulting in oxygen content increasing in the tumor area to improve radiosensitivity, which can convert tumors from radioresistant to radiosensitive. Additionally, ACF in ACF-CAT@Lipo could improve hypoxia status and then down-regulated the expression of HIF-1α. Besides, the transcriptomic analysis results demonstrated that the therapeutic efficacy of 125I brachytherapy can be enhanced promptly with the aid of HIF-1 inhibition and O2 supply. The results in vitro and in vivo showed that ACF-CAT@Lipo could enhance the efficiency of 125I irradiation on tumor cells and improve the effect of inhibiting tumor growth.

Conclusions: The oxygen enrichment and HIF-1 inhibition function of ACF-CAT@Lipo provides a new strategy to overcome the brachytherapy resistance of esophageal cancer therapy

Keywords: Esophageal cancer, 125I brachytherapy, Tumor hypoxia, HIF-1 functional inhibition, Radiosensitizer

SGI-P08

Colorectal cancer incidence, Single center data results

Munkhsaruul Bayaraa, Bayasgalan Luvsandagva, Battulga Adyasuren, Narantsatsralt Jalbuu, Davaadorj Duger

Gastroenterology and Endoscopy Department, Ulaanbaatar Songdo Hospital, Ulaanbaatar City, Mongolia

Background / aims: Colorectal cancer is the 6th most common cancer in Mongolia for both males and females. In 2020, the colon and rectum cancer was recorded approximately 4% (262) among the all newly recorded cancer cases. The prevalence of colon cancer is 8.1 in males and 8.3 in females per 10.000 populations. The department of endoscopy at Ulaanbaatar Songdo Hospital has diagnosed 28.6% of all newly diagnosed colorectal cancer in Mongolia. According to the TNM classification, 42% of colorectal cancer were diagnosed at stage 3 and 37.4% at stage 4. In recent 5 years of prevalence, incidence, and mortality is keep increasing.

Methods: We selected a total of 38950 consecutive colonoscopy results from 2009 to 2021 in the deparments of Gastroenterology and Endoscopy at Ulaanbaatar Songdo Hospital, Mongolia. We took histologically confirmed colorectal cancer cases, and classified by their age, distribution, location, pathological type, and treatment method.

Results: The mean age of patients diagnosed with colorectal cancer was 60.3±14.3. The gender ratio for 45% males and 55% for females. We totally diagnosed 982 colorectal cancer from 2009 to 2021 among those examined by routine colonoscopy. The incidence of colorectal cancer increased from 1.60% in 2009 to 3.6% in 2021. Colorectal ESD treatment was also increased from 0 to 11. The location of colorectal cancer that we diagnosed by colonoscopy was 52.5% in the sigmoid colon, 9.3% in ascending colon, 8.9% in hepatic flexure, 8.6% in the cecum, and 20.7% in other sites. According to pathological type, 93% was adenocarcinoma, 3% percent was signet cell carcinoma, and 4% was others in pathological type.

Conclusions: The incidence of colorectal cancer is increasing in recent years. Colonoscopy plays a crucial role in diagnosing and treating colorectal cancer.

Keywords: Colorectal cancer, Pathological type of colorectal cancer, Colonoscopy

SGI-P09

Stent electrode for radiofrequency ablation in the rat esophagus: A preliminary study

Dong-Sung Won[1], Yubeen Park[2], Sang Soo Lee[2], Jung-Hoon Park[1]

[1]Biomedical Engineering Research Center, Asan Institute for Life Sciences, Asan Medical Center, Seoul, Korea, [2]Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Background / aims: Endoluminal radiofrequency (RF) electrodes have been developed for the management of inoperable biliopancreatic ductal cancers and Barrett's esophagus but, the formation of a uniform ablation zone is still challenging. The purpose was to investigate technical feasibility and efficacy of RF ablation with use of a novel stent electrode (SE) in the rat esophagus.

Methods: RF protocol was determined to the exposed rat esophagus reached at 70 °C at 30, 40, and 50 W, respectively. Eighteen of 21 male rats received RF ablation with SE and the remining three rats received a sham procedure. Histological changes including the thickness of the submucosal fibrosis, thickness of the epithelial layer, degree of inflammatory cell infiltration, and degree of collagen deposition were analyzed and compared with sham control at immediately (n = 6), 1 week (n = 6), and 2 weeks (n = 6). TUNEL and HSP70-positive deposition were evaluated and compared between the groups.

Results: The optimal RF protocol was at 40 W and 480 kHz for 60 sec for the rat esophagus. The stent- directed RF ablation was successful in 16 (88.8%) of the 18 rats. The degrees of RF-induced fibrotic changes and inflammatory cell infiltration were significantly and gradually increased compared with the sham control at 1 and 2 weeks (all $p < 0.05$). The thickness of epithelial layer was significantly lower at immediately ($p < 0.05$) but, gradually increased at 1 and 2 weeks (all $p < 0.001$) compared with the sham control. TUNEL- positive deposition and HSP70-positive deposition were significantly different compared with sham control at immediately, 1 and 2 weeks (all $p < 0.001$).

Conclusions: The SE can maximize the RF ablation- induced therapeutic effects by fully contacting the inner wall of the rat esophagus. The stent- directed RF ablation is technically feasible and effective to evenly induce thermal damages in the rat esophagus.

Keywords: Barrett's esophagus, Radiofrequency ablation, Heat treatment, Stent, Electrode

SGI-P10

Outcomes of percutaneous trans-gastric endoluminal access used for single stage image guided procedures, a single centre study

Mohammed Rashid Akhtar, Mary Renton, Jimmy Kyaw Tun, Deborah Low, Ian Renfrew, Timothy Fotheringham

Interventional Radiology, The Royal London Hospital, Whitechapel, London, UK

Background / aims: Percutaneous transgastric endoluminal access (PTEA) can be used during image guided treatment of pancreatic collections (cystogastostomy) or duodenal stent insertion, as an alternative to peroral access. After completion of the procedure, gastric access can be removed (single stage) or a covering gastrostomy can be inserted. The aim of the study was to determine the complication rate for PTEA as a single stage procedure.

Methods: Retrospective review of patients having PTEA as part of a single stage procedure, in a single institution, between February 2011 & February 2021. Outcomes were assessed reviewing the electronic patient records and imaging studies. All patients had insertion of two gastropexy sutures during transgastric access. Patients had a either cystogastrostomy or a duodenal stent insertion.

Results: During the study period, 74 patients were identified having 81 procedures attempted. PTEA was achieved in all cases 81/81 (100%). The indication for PTEA in, cystogastrostomy in 51 cases and duodenal stenting in 30 cases. In the duodenal stenting group, 15 cases (50%) had previous failed attempt at endoscopic stenting. Overall procedural technical success was 76/81 (93.8%). There was one failure performing a cystogastrostomy 1/51 (2%) and four failures to place a duodenal stent 4/30 (13.3%). Venting gastrostomy was placed in the 4 patients who had failed duodenal stenting, these 4 cases were subsequently excluded from the PTEA cohort. PTEA complications were seen in 12/77 cases (15.6%), 11 complications were minor and self-limiting; localised pain (n=7), symptomatic pneumoperitoneum (n=3) and haemorrhage not requiring treatment (n=1). One major complication (1.3%) was seen in a cystogastrostomy patient, with an intraperitoneal collection from the gastric access site requiring treatment with a percutaneous drain.

Conclusions: Percutaneous transgastric access is a useful technique for accessing pancreatic collections or duodenal strictures. The findings suggest procedures can be carried out in a single stage procedure without a covering gastrostomy tube.

Keywords: Percutaneous Gastric Duodenal Pancreatic Intervention

SGI-P11

Flexible 3D nanonetworked silica film as a polymer-free drug-eluting stent to suppress tissue hyperplasia in the rat esophagus

Jeon Min Kang[1], Chu Hui Zeng[1], Wooram Park[2], Joonseok Lee[3], Jung-Hoon Park[1]

[1]Biomedical Engineering Research Center, Asan Institute for Life Sciences, Asan Medical Center, Seoul, Korea, [2]Department of Integrative Biotechnology, College of Biotechnology and Bioengineering, Sungkyunkwan University, Suwon, Korea, [3]Research Institute for Convergence of Basic Sciences, Hanyang University, Seoul, Korea

Background / aims: Loading and eluting drugs on self-expandable metallic stents (SEMSs) can be challenging in terms of fabrication, mechanical stability, and therapeutic effects. The newly developed nanonetworked silica film (NSF) was sufficiently flexible, crack-free, and withstood the dynamic expansion of the SEMS. The purpose of this study was to investigate the efficacy and safety of NSF as a drug delivery platform on a SEMS surface in the rat esophagus.

Methods: The NSF-coated SEMS was successfully fabricated using a bottom-up strategy. Then, mechanical properties and drug release profiles on the NSF-coated SEMS were analyzed. The drug-eluting efficacy of NSF was assessed in a rat esophagus, thirty rats were randomly divided into three groups (10 rats each). The animals in the control group (non-coated SEMS) and NSF group (NSF-coated SEMS) and NSF@SRL-SEMS group (sirolimus-loaded NSF-SEMS) were sacrificed 4 weeks after stent placement.

Results: The fabricated NSF was loaded with sirolimus 4.7 times more than the polymer-coated commercial stent based on the same thickness of the coating layer. The drug release profile was verified to be a twofold delay in the NSF group compared to the control group without NSF. All procedures were successful in all of the rats. Tissue hyperplasia-related variables were significantly lower in NSF@SRL-SEMS group than in control and NSF groups (all variables, $p < 0.05$). The inflammatory cell infiltration and TUNEL expression did not differ significantly among the groups ($p = 0.687$ and $p = 0.569$).

Conclusions: The NSF showed excellent mechanical stability, including flexibility and adhesion, and met the requirements of a drug delivery platform for SEMSs. In vivo results showed the slow elution of SRL and suppression of tissue hyperplasia, proving the potential of NSF-SEMS as a platform for polymer-free DESs. Thus, the developed NSF is a promising polymer-free drug delivery platform to efficiently treat esophageal stricture.

Keywords: Drug-eluting stents, Esophagus stricture, Stent-induced tissue hyperplasia, Nanonetworked film, Polymer-free film.

SGI-P12

Efficacy and safety evaluation of hemostatic powder in Yucatan swine bleeding models

Jin Hee Maeng[1], Yu Su Yeol[1], Beom Hee Lee[2], Hui-Jin Lee[1], Eunhye Lee[3]

[1]Development Dept., Nextbiomedical Co., Ltd, Incheon, Korea, [2]Research, National Center of Efficacy Evaluation for the Development of Health Products Targeting Digestive Disorders, Incheon, Korea, [3]Research & Development Dept, Utah-Inha DDS & Advanced Therapeutics Research Center, Incheon, Korea

Background / aims: This study was to evaluate hemostatic efficacy and safety of the Nexpowder™ in Yucatan swine bleeding models.

Methods: In this study, the ESD bleeding model (Group I) and gastroepiploic artery bleeding model (Group II) were used as two different types of bleeding model. Nexpowder were applied to each 6 animals at the bleeding site in Group I and II. Evaluation criteria of this study is following: 1) initial hemostasis within 5 minutes, 2) Day 3 re-bleeding rate and 3) safety. Among safety evaluation, gas embolism and perforation through EUS and CT scan, respectively.

Results: The spurting (Forrest Ia) and oozing (Forrest Ib) bleeding were successfully induced in Group I and II, respectively. The initial hemostasis rate differed according to the type of bleeding, and the results were 6/6 (100%) in Group I and 4/6 (67%) in Group II, respectively. The re-bleeding rate at Day 30 was 0/6 (0%) in both groups. No gas embolism or perforation occurred in any of the animals. Furthermore, there were no notable clinical pathological examination results, and there were no necropsy findings related hemostatic article administration.

Conclusions: In this study, the hemostatic efficacy and safety of Nexpowder™ were confirmed in two porcine bleeding models. Based on these results, Nexpowder™ could be considered as a first-line treatment for oozing bleeding occurring in the upper gastrointestinal tract and for spurting bleeding, it is expected that combination therapy can effectively control bleeding, rather than monotherapy, according to clinical guidelines.

Keywords: Upper gastrointestinal bleeding (UGIB), Endoscopic submucosal dissection, Gastroepiploic artery bleeding

SGI-P13

Image-guided stent-directed irreversible electroporation for circumferential ablation in the rat esophagus

Song Hee Kim[1], Jeon Min Kang[2], Sang Soo Lee[1], Jung-Hoon Park[2]

[1]Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, [2]Biomedical Engineering Research Center, Asan Institute for Life Sciences, Asan Medical Center, Seoul, Korea

Background / aims: Irreversible electroporation (IRE) has been investigated in the alimentary tract; however, lack of dedicated electrode and insufficient tissue response made its application limited. The aim was to investigate the efficacy and safety of image-guided stent- directed IRE in the rat esophagus.

Methods: The bipolar self- expandable electrode (SE) was developed by the braiding technique. A finite element analysis was performed to validate optimal electrical field strength for the rat esophagus. Forty of 50 rats received stent-directed IRE and sacrificed at 10 hours, 3 days, 7 days, and 28 days of 10 each. The remaining ten rats underwent sham procedure. The outcomes of stent- directed IRE were assessed by esophagography and histological responses.

Results: Stent-directed IRE was technically successful in all rats with mild muscle contraction. Heart rate dropped immediately and gradually recovered at 180 s. TUNEL and Caspase-3 with submucosal thickness significantly increased at 10 hours and Day 3 compared with the sham control (all $p < 0.001$). The thickness of epithelial layers with collagen deposition significantly decreased at 10 hours and Day 3 (all $p < 0.001$); however, increased at Day 7 compared with the sham control (all $p < 0.05$). The Ki67 positive deposition significantly increased at Days 3 and 7 compared with the sham control (all $p < 0.001$). All variables were similar with the sham control at Day 28.

Conclusions: Image-guided stent- directed IRE was effective and safe in the rat esophagus. It seems to be effectively and evenly induced cell death, and gradually recovered with cellular regeneration.

Keywords: Irreversible electroporation, Self-expandable stent, Esophageal model, Electrode, Ablation

SGI-P14

Photosensitizer-embedded intragastric satiety-inducing device to inhibit weight gain

Dae Sung Ryu[1], Ji Won Kim[1], Hee Kyong Na[1], Do Hoon Kim[1], Jin Hee Noh[1], Jung-Hoon Park[2], Hwoon-Yong Jung[1]

[1]Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, [2]Biomedical Engineering Research Center, Asan Institute for Life Sciences, Asan Medical Center, Seoul, Korea

Background / aims: Intragastric satiety-inducing device (ISD) developed to suppress weight gain and reduce ghrelin hormone. The efficacy and safety of single photodynamic therapy (PDT) using a photosensitizer (PS)-embedded ISD for the treatment of obesity were investigated.

Methods: L929 and AGS cells were used to assess efficacy of PDT using PS (methylene blue, MB)-coated stent pieces including reactive oxygen species (ROS) generation, cytotoxicity, phototoxicity and residual surface. Four of the five pigs underwent PDT using MB-embedded ISD and sacrificed immediately and 1, 2, and 4 weeks after PDT. The remaining pig as a control pig was sacrificed at 4 weeks. The total body weight gain (%TBWG), ghrelin hormone levels (%GL) and histological changes were accessed to evaluate its efficacy.

Results: The higher MB concentration of the coating solution generated a greater amount of ROS. The Phototoxicity of MB-coated stent pieces shown to induce cell death at 0.50 mg/mL or 1.00 mg/mL irradiated with more than 3 J/cm2. The residual percentages of MB were 91.41% (improved solubility). PDT using MB-embedded ISD was successfully performed without any procedure-related complications in all pigs. %TBWG had 2-fold reduced (12% in PDT vs. 24% in control) and 2-fold reduced %GL (21.2 pg/mL in PDT vs. 45.1 pg/mL in control) at first week. Inflammatory cell infiltration, collagen deposition and TUNEL-positive deposition were increased in the pigs immediately sacrificed after PDT and gradually recovered from the first to the fourth week.

Conclusions: Single PDT using MB-embedded ISD successfully suppressed anti-ghrelin positive deposition and weight gain resulting from stimulated ghrelin-producing cells. This effect was maintained for 2 weeks after the PDT procedure; however, the hormone level after 3 to 4 weeks was similar to that of the control pig, and histological changes also gradually recovered over time. Repeated PDT is required to maintain weight loss and hormone reduction for long-term efficacy.

Keywords: Obesity, Photodynamic therapy, Photodynamic stent, Methylene blue, Ghrelin

SGI-P15

Photoreactive intragastric satiety-inducing device for suppresses weight gain toward minimally invasive treatment

Ji Won Kim[1], Dae Sung Ryu[2], Hee Kyong Na[1], Do Hoon Kim[1], Jin Hee Noh[1], Kun Na[3], Jung-Hoon Park[2], Hwoon-Yong Jung[1]

[1]Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, [2]Biomedical Engineering Research Center, Asan Medical Center, Seoul, Korea, [3]Department of Biotechnology, The Catholic University, Gyeonggi-do, Korea

Background / aims: An intragastric satiety-inducing device (ISD) is a minimally invasive approach to induce satiety by continuously pressing the stomach and stimulating ghrelin-producing cells. Photodynamic therapy (PDT) can be combined by generating singlet oxygen under laser irradiation to enhance the effects of ISD. This study aimed to investigate the efficacy and safety of PDT with ISD to suppress weight gain in a mini pig.

Methods: Characteristics of chlorin e6 (Ce6), photosensitizer for PDT, samples were evaluated including photo-responsive cell death. Ce6 was conjugated with polymer to homogeneously coat on the disk portion of the ISD. Twelve mini pigs were randomized into control, single PDT, ISD, and ISD plus PDT groups with three in each. The remaining three pigs were used as a control. The therapeutic effectiveness was assessed by comparing weight changes, hormone levels, and histological examination.

Results: Cell death increased 3.2-fold at concentration of 5 μg/mL compared to the absence of laser irradiation. All ISD migrated into the stomach at 2-3 weeks. The results of study, ISD with PDT proved to be the most effective for wight loss. Their changes of body weight (control: 28% vs ISD plus PDT: 4%, $p < 0.001$), ghrelin (control: 4% vs ISD plus PDT: -35%, $p < 0.001$) and leptin levels (control: 8% vs ISD plus PDT: 35%, $p < 0.001$) were significantly affected. Histological examination results were similar.

Conclusions: Photoreactive ISD can be easily accessed via minimally invasive approach and combination therapy significantly enhanced suppress weight gain effects by effectively stimulated ghrelin producing cells. Combination therapy was safe and effective to suppress weight gain by reducing ghrelin hormone secretion in a mini pig model.

Keywords: Obesity, Intragastric satiety device, Chlorin e6, Photodynamic therapy, Stents

SGI-P16

Cytomegalovirus enteritis in patient who underwent steroid treatment presenting as massive hematochezia

Kwangwoo Nam[1], Jinmo Kim[1], Sunghyeok Rhou[1], Won-Ae Lee[2]

[1]Gastroenterology, Dankook University Hospital, Cheonan, Korea, [2]Pathology, Dankook University Hospital, Cheonan, Korea

Contents: A 79-year-old man presented with massive hematochezia and anemia. He had commodities with diabetes, hypertension, dyslipidemia, and Parkinson's disease. In addition, he had recent history of COVID-19 infection two months prior, and history of urinary tract infection with sepsis following pseudomembranous colitis one month prior in outside hospital. At admission, generalized edema and skin petechiae were prominent, and hematochezia and azotemia were gradually aggravated after admission. For the high suspicion of vasculitis, empirical methylprednisolone was administered. However massive hematochezia occurred after the initiation of steroid. In emergency colonoscopy, fresh colored blood was noted from the terminal ileum to the rectum, however in upper endoscopy, there was no sign of recent bleeding except multiple hemorrhagic spots in the stomach and scattered erosions with ulcers between the distal duodenum and proximal jejunum. Considering high possibility of small bowel bleeding, angiographic embolization for the proximal jejunal branch of SMA was performed. However, hematochezia persisted, thus peroral single balloon enteroscopy was performed which showed no evidence of bleeding from the distal jejunum except multiple discrete severe ulcers with erosion, mucosal friability, and hyperemia between the proximal and mid jejunum, suggesting cytomegalovirus (CMV) enteritis. Intravenous ganciclovir was started, and CMV enteritis was finally diagnosed in the histopathology and serologic test. Unfortunately, recurrent uncontrolled bleeding persisted thus the patient underwent additional surgery and angiographic embolization. The surgical specimen showed corresponding findings with CMV enteritis. CMV infection can occur anywhere in the gastrointestinal tract from the mouth to the anus. The small bowel is the most rarely involved organ, but known to have the worst prognosis due to delayed diagnosis. CMV enteritis can present as massive gastrointestinal bleeding, perforation and stenosis. Prompt administration of ganciclovir is highly recommended.

Keywords: Cytomegalovirus, Enteritis, Hematochezia, Enteroscopy

SGI-P17

Clinical outcomes of endoscopic stent insertion or bypass operation for malignant colonic obstruction due to pancreatobiliary cancer

Chan Su Park, So Jeong Kim, Eun Ae Kang, Jihye Park, Jung Hyun Jo, Hee Seung Lee, Soo Jung Park, Moon Jae Chung, Jeong Youp Park, Jae Hee Cheon, Seungmin Bang, Seung Woo Park, Tae Il Kim, Si Young Song, Jae Jun Park

Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Korea

Background / aims: Although self-expandable metal stent (SEMS) insertion has been shown to be an effective therapy for palliation of obstruction from pancreatobiliary malignancy, Studies on comparative clinical outcomes to bypass surgery is limited.

Methods: This is a retrospective, single tertiary-center study that involved all consecutive patients with pancreatic cancer or biliary tract cancer who were treated with SEMS (n=53) or emergency surgery (n=5) for palliation of malignant colorectal obstruction between January 2005 and December 2021. Time to recurrent obstruction requiring additional intervention and stent patency was analyzed by Kaplan-Meier analysis. Factors related to clinical outcomes were analyzed by log-rank test and Cox regression analysis.

Results: The types of cancer included were 48 patients (82.8%) with pancreatic cancer, 3 patients (5.2%) with biliary cancer, and Gallbladder cancer is 7 (12.1%). The technical succession rate of the SEMS group and emergency surgery group was 98.1% (52/53) and 100% (5/5), and the clinical success rate was 84.9% (45/53) and 100% (5/5), respectively. There was no significant statistical difference between SEMS and the bypass operation group (p=0.349). Regarding the time to recurrent obstruction required additional intervention, there was no marginally improved longer duration of time to recurrent obstruction in the bypass operation group (p=0.101). When we analyzed in a subgroup of the stent population, palliative chemotherapy after stenting was associated with increased duration of stent patency (p=0.019, Log-rank).

Conclusions: In patients with colorectal obstruction due to pancreaticobiliary malignancy, the short-term clinical outcomes of the bypass surgery group were comparable to the stent group. However, the surgery group showed a trend for favorable long-term outcomes in terms of reintervention-free survival. Palliative chemotherapy was associated with an increased duration of stent patency.

Keywords: Colorectal obstruction, Self-expandable metal stent, Bypass surgery, Pancreatobiliary cancer

SGI-P18

CircACTR2 upregulates CCL20 by sponging miR-10b-5p and recruiting EZH2 to promote gastric cancer

Chen Lu, Zekuan Xu

Department of General Surgery, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China

Background / aims: As a kind of malignant tumors, gastric cancer (GC) has been studied continuously, but the mechanisms are not well understood. Circular RNAs (circRNAs) play an important role in the occurrence of diseases. The role of circRNAs in GC remains to be further explored.

Methods: RNA sequencing analysis was used to assess plasma from gastric cancer patients and healthy controls and identify circRNAs involved in GC tumorigenesis. RNA transcriptome sequencing was used to determine changes in gene expression downstream of circACTR2. Fluorescence in situ hybridization, dual-luciferase reporter assays and RNA immunoprecipitation were carried out to assess the circACTR2 regulation mechanism of downstream target genes.

Results: CircACTR2 was overexpressed in GC. Clinicopathological data revealed that abnormally high circACTR2 expression was associated with a poor prognosis. In function, circACTR2 promotes the malignant phenotype of GC cells in vivo and in vitro, inhibits cycle arrest, and decreases the proportion of apoptotic cells. In mechanism, it can upregulate C-C motif chemokine ligand 20 (CCL20) in GC cells, thereby regulating the phosphoinositide 3-kinase (PI3K)/Akt pathway and other key downstream effectors. Furthermore, circACTR2 prolonged the half-life of CCL20 mRNA by recruiting the Enhancer Of Zeste Homolog 2 (EZH2) and acted as a sponge of hsa-miR-10b-5p to suppress the silencing effect of hsa-miR-10b-5p on CCL20.

Conclusions: CircACTR2 can increase the expression of CCL20 to promote the progression of GC by sponging hsa-miR-10b-5p and recruiting EZH2, and is promising as a novel biomarker and therapeutic target.

Keywords: CircACTR2, CCL20, Gastric cancer, MiR-10b-5p

SGI-P19

Endoscopic removal of invaginated adenoma of appendix

Ivan Nedoluzhko, Ivan Kanishchev, Kirill Shishin, Lada Shumkina

Operative Endoscopy, Moscow Clinical Scientific Center, Moscow, Russian Federation

Contents: Peitz-Jaegers syndrome is a rare autosomal dominant disease characterized by the presence of multiple hamartomic polyps in various parts of the gastrointestinal tract, as well as pigmented spots on the mucous membrane and skin. Patient 27 y.o. has been observed for a long time by a gastroenterologist with a diagnosis of Peitz-Jaegers syndrome. While screening colonoscopy a neoplasm on a long thick leg was detected in the cecum, the base coming from the appendix. According to computed tomography of the abdomen in the cecum, the previously described neoplasm of the base emanating from the area of the appendix is determined. It is impossible to exclude an invaginated adenoma of the vermiform process. Attempt to perform endoscopic surgery was recommended. Intraoperatively, a neoplasm up to 30 mm in size is visualized in the cecum, located on a twisted wide leg emanating from the appendix area. The leg of the neoplasm is represented by an unchanged mucosa, probably an invaginated appendix. Two endoscopic hemostatic loops (Polyloop) were installed on the base of the neoplasm leg, after which the neoplasm was removed with an endoscopic loop in the «Dry cut» mode. There were no signs of intraoperative bleeding. For preventive purposes, three endoscopic clips are installed on the intersection area above the loops. The removed neoplasm was extracted. The postoperative period proceeded without complications. The patient was discharged on the third day after operation. The macropreparation is represented by an invaginated adenoma of the appendix. The result of histological examination: hamartomic polyp. During a control colonoscopy after three months, no signs of recurrence of the disease in the area of endoscopic intervention were revealed. The use of combined endoscopic techniques expands the possibilities of radical removal of neoplasms of various localizations.

Keywords: Adenoma appendix

SGI-P20

Retrospective study on the Gastroscopy and histopathology finding of 1857 patients with various gastroscopy indications in Calmette hospital during 3 years (From 1st May 2016 to 31st December 2018)

Kaing Kimyi, Sorng Sophirom, Chea Khang, Chey Vithiarithy, Chea Ong, Chhit Dimanche, Unn Keoseyla, Un Seiha, Nov Neang, Mon Panha, Kang Khounthai, Um Sokchay, Uong Panha, Kann Sovannvireak, Sou Syphanna

Gastroenterology, Khmer-soviet Friendship Hospital, Phnom Penh, Cambodia

Background / aims: The aim was to document the demographic characteristics, different gastroscopy indications, gastroscopy findings, and pathology findings. The main objective was to study the prevalence of Hp infection and its association with various symptoms and endoscopic lesions finding. And also to determine the age risk of upper GI cancer among our populations.

Methods: This is the retrospective, mono-center study, and it was conducted in Calmette hospital from 1st January 2016 till 31st December 2018, recorded all patients with various gastroscopy indications and pathology findings. The Hp infection was analyzed with different mono-variable to find out the statistically significant associations.

Results: Among 1,857 patients who underwent gastroscopy with biopsy, 54.4% were females (F/M: 1.17/1 with the mean age of 49.05 ± 15.855. Dyspepsia (67.6%) and Anemia (8.9%) were the most common of gastroscopy indications. Gastric erythema and normal mucosa represented 36% and 21.2%, respectively. The overall of Hp infection was 36.8%. There were totally no significant differences in the demographic of patients with Hp infections. However, anemia and gastric/duodenal ulcer were statistically significant with Hp infection, which represented 46.1% vs 35.8% with p-value = 0.016, and 46.4% vs 35.8% with p-value 0.013, respectively. The age cut-off of upper GI cancer among these patients was 38 years (AUC = 0.722, P < 0.0001).

Conclusions: Dyspepsia and anemia were the most common symptoms of gastroscopy indications. The overall of Hp infection was high. No gender nor age groups were different statistically significant with Hp infections. Anemia and gastric/duodenal ulcer were only significantly associated symptoms and lesion findings with Hp infections. The age cut-off of upper GI malignancy was 38 years.

Keywords: Gastric biopsy, Gastroscopy indication, Pathology, Helicobacter pylori, Gastric cancer

SGI-P21

Value of investigation among patients with chronic dyspepsia in Cambodia: A mono-center experience

Mon Panha, Chea Khang, Sorng Sophirom, Uong Panha, Nov Neang, Kang Khounthai, Kaing Kimyi, Un Seiha, Un Keoseyla, Kann Sovanvireak, Um Sokchay, Chhit Dimanche, Ny Tharuom, Chhay Kimpav, Khuon Viseth, Sann Channa, Chey Vithiarithy, Sou Syphana

Gastroenterology, Khmer Soviet Friendship Hospital, Phnom Penh, Cambodia

Background / aims: The investigation of choice for uninvestigated dyspepsia patient may varied on the optimal age cut-off, alarm sign, prevalence of Helicobacter pylori and gastric cancer by different geographically and ethically. In Cambodia, there is no sufficient data reported whatever the management appropriate for these patients. The aim of this study was evaluated whether the gastroscopy and urea breath test be of benefit in the management of dyspepsia patients.

Methods: It was a retrospective mono-center study of 289 out-patients' adult with dyspepsia sign underwent un elective diagnostic by using gastroscopy with pathology and urea breath test. We analysis the characteristic of these two group investigated, the age risk of organic lesion, Helicobacter pylori prevalence, and endoscopic and histologic findings.

Results: These two groups of patients (EGD versus UBT) was similar between gender and geography. Female was more affected with dyspepsia. The mean age of EGD group were elder than UBT group (47 years versus 40 years). The high prevalence of helicobacter pylori found in both elective diagnostics 28.5% and 51%. Organic lesions were diagnosed in 38%. Gastric/duodenal ulcer and Upper GI cancer represented 5.3% and 3.2%. The majority of patient with organic lesion were age 38 or over. The pathology result reported chronic gastritis (75.1%), intestinal metaplasia (38.8%) and Dysplasia (1.2%).

Conclusions: Our population might more diagnosis as helicobacter pylori-associated dyspepsia. This study showed many cases of organic lesions than previously reported and the age risk of organic lesion was younger. Also as the intestinal metaplasia was a premalignant cancer. The investigation in dyspepsia patient will be benefit in the management of dyspepsia patient. Further prospective studies, especially age risk of gastric cancer in general population for decision between EGD and non-invasive test for the appropriate management.

Keywords: Dyspepsie, Helicobacter pylori, Breath test, Histopathology, Esophagogastroduodenoscopy

SGI-P22

Endoscopic submucosal dissection for early gastric cancer that is not indicated for endoscopic resection in elderly patients

Seokin Kang[2], Jeong Hoon Lee[1], Yuri Kim[1], Kwangbeom Park[1], Hee Kyong Na[1], Ji Yong Ahn[1], Kee Wook Jung[1], Do Hoon Kim[1], Kee Don Choi[1], Ho June Song[1], Gin Hyug Lee[1], Hwoon-Yong Jung[1]

[1]Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, [2]Department of Internal Medicine, Ilsan Paik Hospital, Inje University College of Medicine, Goyang, Korea

Background / aims: Endoscopic submucosal dissection (ESD) is sometimes performed for early gastric cancer (EGC) which is not indicated for endoscopic resection (ER) in elderly patients considering old age and comorbidities. We aimed to compare outcomes between ESD and surgery in elderly patients with EGC that is not indicated for ER.

Methods: Elderly patients aged ≥75 years who underwent either ESD or surgery for EGC which was not indicated for ER between 2005 and 2015 were retrospectively investigated. The patients were dived into two groups: the ESD group contained those who underwent ESD only and the surgery group included patients who underwent primary surgery or additional surgery after non-curative ESD.

Results: Among a total of 294 patients, 48 (16.3%) patients underwent ESD only (the ESD group) and 246 (83.7%) patients underwent either primary surgery or additional surgery after non-curative ESD (the surgery group). The ESD group had smaller size of tumors (25 vs. 30 mm, p=0.001) and higher rate of differentiated-type cancer than the surgery group had (87.5% vs. 62.2%, p=0.001). The median observation period was 91.8 months. ESD showed lower disease-free survival than surgery (p=0.045). However, overall survival between two groups had no significant difference (p=0.522). Factors associated with overall survival were age, prognostic nutritional index and lymphovascular invasion.

Conclusions: In elderly patients aged ≥75 years with EGC which is not indicated for ER, ESD may yield comparable overall survival to surgery.

Keywords: Endoscopic submucosal dissection, Elderly patient, Early gastric cancer, Gastrectomy

SGI-P23

Natural history of gastric leiomyoma

Kwangbeom Park, Ji Yong Ahn

Department of Gastroenterology, Asan Medical Center, Seoul, Korea

Background / aims: Gastric leiomyoma is known as benign subepithelial lesions (SELs). Although most of gastric leiomyoma are asymptomatic and do not increase in size, some of them grow, leading to surgery in order to differentiate from malignancies. Herein, we investigated the natural history of histologically proven gastric leiomyoma.

Methods: We retrospectively reviewed histologically proven gastric leiomyoma by endoscopic biopsy or surgery in our center from August 1997 to July 2021. Baseline characteristics of the total number of gastric leiomyoma were described and cases that followed up with at least 12 month-interval without immediate resection were analyzed. The primary outcome was the frequency of size increase (more than 25%) during follow-up period and the secondary outcome was the histopathologic results of resected cases.

Results: Among 230 patients with histologically proven gastric leiomyoma, 130 (56.5%) were female and the median age was 43 years (interquartile range 34 to 52.8). The most frequent location was the cardia (77.4%), the median size was 3 cm (interquartile range 2 to 4.2), and the largest size was 15 cm. In 83 followed up cases, the median size was 2.5 cm (interquartile range 2 to 3) and the median follow up period was 50 months (interquartile range 27.1 to 91.4). During the follow-up periods, increasing size was found in 1 cases (1.2%), and then the increased case underwent surgery (diagnosed as leiomyoma). Of 17 cases which were resected (12 surgery and 5 endoscopic resection) due to increased size or the location of tumors, all were revealed as leiomyoma and malignant transformation was not found.

Conclusions: Gastric leiomyoma is benign SELs and increment of size is not frequent even in large sized cases. Therefore closed monitoring with regular follow up may be sufficient in cases of histologically proven gastric leiomyoma.

Keywords: Stomach, Leiomyoma, Subepithelial lesion, Natural history

SGI-P24

Clinical outcomes of marginal ulcer bleeding compared with those of peptic ulcer bleeding

Jun-Young Seo, Ji Young Ahn

Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Background / aims: Marginal ulcer bleeding (MUB) is a complication that could occur following various types of surgery. However, few studies exist on it. Therefore, this study aimed to compare the clinical outcomes of MUB with those of peptic ulcer bleeding (PUB).

Methods: Between January 2013 and December 2017, 5076 patients underwent emergent esophagogastroduodenoscopy for suspected upper gastrointestinal bleeding. We retrospectively reviewed and analyzed the medical records of MUB and PUB patients and developed a propensity score matching (PSM) method to adjust for between-group differences in baseline characteristics with 1:2 ratios. Sex, age, BMI, underlying diseases, and drugs were included as matching factors.

Results: A total of 64 patients and 678 patients were diagnosed with MUB and PUB on emergent esophagogastroduodenoscopy, and 62 MUB and 124 PUB patients were selected after PSM, respectively. Rebleeding was significantly higher in MUB patients than in PUB patients (57.8% vs 9.1%, p <0.001). Mortality caused by bleeding was higher in MUB patients than in PUB patients (4.7% vs. 0.4%, p <0.001). Multivariate analysis revealed that proton pump inhibitor (PPI) administration (odds ratio [OR], 0.14; 95% confidence interval [CI], 0.03–0.56; p=0.011) after first bleeding was inversely correlated with MUB rebleeding. Large ulcer size (>1 cm) (OR, 6.69; 95% CI, 1.95–27.94; p=0.005) and surgery covering pancreas (OR, 3.97; 95% CI, 1.19–15.04) were independent risk factors for MUB rebleeding.

Conclusions: MUB showed a severe clinical course than PUB. Therefore, MUB should be managed more cautiously, especially for large ulcers and pancreatic surgery. Prophylactic PPI administration may be helpful in reducing rebleeding in MUB.

Keywords: Hemorrhage, Ulcer, Proton Pumps

SGI-P25

Risk factors of post-procedural fever in a patient who underwent esophageal endoscopic submucosal dissection

Yuri Kim, Ho Jung Song, Hee Kyong Na, Ji Yong Ahn, Jeong Hoon Lee, Kee Wook Jung, Do Hoon Kim, Kee Don Choi, Gin Hyug Lee, Hwoon-Yong Jung

Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Background / aims: Endoscopic submucosal dissection (ESD) performed on an esophageal lesion resulted in fever in many patients; nevertheless, the risk factors for fever and the likelihood of a true infection are unknown. This study aims to determine the prevalence of post-ESD fever and any potential risk factors.

Methods: We retrospectively reviewed the medical records of 202 cases of esophageal ESD between January 2020 and January 2022. Patients were separated into two groups: those with fever and without fever.

Results: There were 94 incidences of fever out of a total of 202 cases (46.5%). In the fever group, the median peak temperature was 38.1℃ (37.9 – 38.3). Six cases out of five patients had positive culture results, however only one patient with positive blood culture was considered as a clinically true infection. Cases in the fever group had larger tumor size (17.0 mm vs. 24.5 mm, P = 0.007), longer hemostasis time (3.0 min vs. 5.0 min, P = 0.003), a greater submucosal injection volume (50.0 cc vs. 60.0 cc, P = 0.040) and a lower rate of local steroid injection (10.2% vs. 3.2%, P = 0.044) than those of no fever group. In logistic regression analysis, tumor size > 20 mm (OR: 2.296, 95% CI: 1.204 – 4.378, p = 0.012) and hemostasis time > 4 min (OR: 2.721, 95% CI 1.458 – 5.076, P = 0.002) were identified as risk factors for post-procedural fever, although local steroid injection (OR: 0.105, 95% CI: 0.025 – 0.441, P = 0.002) was inversely linked with fever.

Conclusions: Most post-ESD fevers were not accompanied by true infection. However, it is recommended that patients with large tumors and lengthy hemostasis times be closely monitored for fever.

Keywords: Endoscopic submucosal dissection, Esophageal cancer, Esophageal dysplasia, Fever, Endoscopy

SGI-P26

Clinical outcomes of Dieulafoy's lesion compared to peptic ulcer in upper gastrointestinal bleeding

Jin Hee Noh, Ji Yong Ahn, Hee Kyong Na, Jeong Hoon Lee, Kee Wook Jung, Do Hoon Kim, Kee Don Choi, Ho June Song, Gin Hyug Lee, Hwoon-Yong Jung

Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Background / aims: Although the Dieulafoy's lesion (DL) is one of the important cause of nonvariceal upper gastrointestinal (GI) bleeding, there are few studies about the clinico-epidemiological outcomes due to the low incidence of DL compared with peptic ulcer (PU). We aimed to investigate the clinical features of upper GI bleeding caused by PU or DL and compare the endoscopic treatment outcomes between them.

Methods: Of patients who visit the emergency room for upper GI bleeding from between January 2013 and December 2017, the patients with bleeding resulted from PU or DL were eligible. Clinical features and treatment outcomes were retrospectively investigated by reviewing medical records.

Results: A total of 728 patients with upper GI bleeding due to PU (n=669) and DL (n=59) were included. The median age was 64 years (interquartile range [IQR], 56–75 years), and 74.3% of them were male. PU and DL bleeding were occurred more frequently in lower third and upper third of stomach, respectively (p<0.001). Endoscopic intervention was performed in 53.7% (n=359) of PU group and 98.3% (n=58) of DL group (p<0.0001). DL patients were matched with PU patients by sex, age, body mass index, comorbidity, and past medical history. The rebleeding rates within 7 days (7.37% vs. 17.31%, p=0.037) and 30 days (7.37% vs. 26.92%, p<0.001) after the initial endoscopy were significantly higher in the DL group than PU group both before and after propensity score matching. During median follow-up period of 52 months (IQR, 34–70 months), overall survival rate was not significantly different between two groups (after matching; 67.9% vs. 82.7%, p=0.518).

Conclusions: Although DL is very rare in upper GI bleeding, it requires endoscopic hemostasis more frequently and has a higher rate of rebleeding than PU even after therapeutic endoscopy. The endoscopists should pay attention and perform active endoscopic hemostasis when they meet the DL bleeding.

Keywords: Dieulafoy's lesion, Peptic ulcer, Rebleeding, Upper gastrointestinal bleeding

SGI-P27

Retrospective study of epidemiology, characteristic of dyspepsia in gastroenterology department at Khmer Soviet Friendship Hospital during a year from 1st January 2017 to 31st December 2018

Kang Khoun Thai[1], Kang Chamroeun[2], Chhit Dimanch[1], Unn Keoseyla[1], Oum Sokchay[1], Un Sieha[1], Nov Neang[1], Mon Panha[1], Uong Panha[1], Kaing Kimyi[1], Kann Sovannvirak[1], Ny Tharuom[1], Khuon Viseth[1], Chhay Kimpav[1], Chey Vithiarithy[1], Sou Syphanna[1]

[1]Gastroenterology Department, Khmer Soviet Friendship Hospital, Phnom Penh, Cambodia, [2]Faculty of Medicine, Health Sciences Institute of Royal Cambodian Armed Forces, Phnom Penh, Cambodia

Background / aims: Dyspepsia is the worldwide problem that occurs about 10-30% of the world's population. Overall, among the dyspepsia patients, functional dyspepsia was the most affected (70-80%). The investigation of choice for dyspeptic symptoms is endoscopy with biopsy for histopathology.

Methods: There is a retrospective, descriptive, analytical as well as a mono-center study, and it was conducted in Khmer Soviet Friendship Hospital from 1st January 2016 till 31th December 2017. All patients > 18 years with dyspepsia were collected. Patients who underwent upper gastro intestinal endoscopy for reasons other than dyspepsia and to follow up of known organic lesions were excluded from the study. As well as those patients who take Non-Steroidal Anti-Inflammatory Drugs (NSAID) or Aspirin and who have no complete data were excluded from the study.

Results: Among 1 665 patients with dyspepsia underwent upper gastro intestinal endoscopy, were females more than males, the sex ratio (F/M) are 1.25/1. The mean age was 48.38 years. The majority of patients had epigastric pain syndrome (76.27%), following by upper abdominal bloating (11.65%) and nausea or vomiting (7.56%). Endoscopic result revealed normal 24.14%, erythematous gastritis 39.76%, the cause of organic lesion was gastric erosion 9.97%, gastric ulceration 8.76%, gastric ulcer 4.3%, upper gastro intestinal cancer 5.7% and peptic esophagitis 3.84%.

Conclusions: The majority of dyspepsia is functional, one the main cause of organic lesion was gastric erosion, gastric ulceration, gastric ulcer, upper GI cancer and peptic esophagitis. Upper endoscopy was useful in both to diagnosis and management of dyspepsia.

Keywords: Dyspepsia, Functional dyspepsia, NSAID, Gastroscopy

SGI-P28

Efficacy of endoscopic vacuum therapy (E-VAC) in patients with various transmural defects of the upper gastrointestinal tract

Jun Su Lee, Ji Yong Ahn

Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Background / aims: The optimal therapy of upper gastrointestinal (UGI) transmural defects is not established and controversial. We investigated the efficacy and safety of endoscopic vacuum therapy (E-VAC) in patients with UGI transmural defects.

Methods: This study is single center and retrospective study. Subjects who underwent E-VAC therapy for UGI transmural defects between January 2011 and July 2022 at Asan Medical Center, Seoul, Korea were eligible. All data was collected through the chart review. Outcomes of E-VAC therapy were classified as complete closure, partial response, no response.

Results: A total 63 patients underwent E-VAC therapy for UGI transmural defects. Median age was 64 years (Interquartile range, IQR : 57-70) and 57 patients was male (90.5%). The etiology of UGI transmural defects was various, the most common etiology was esophagectomy including Ivor Lewis operation and Mckeown operation (n=36, 57.1%) and the second was total gastrectomy (n=13, 20.6%). Indication of repair surgery of transmural defects was also diverse and was follows: malignant esophageal disease (n=36, 57.1%), benign esophageal disease (n=10, 15.9%), malignant gastric disease (n=16, 25.4%), benign gastric disease (n=1, 1.6%). The successful rate of E-VAC therapy was 79.4% (n=50) with two median trial number of E-VAC therapy (IQR : 1-3) and median duration of 22 days (IQR : 14- 30 days). Of them, the 6 patients (9.5%) were partial response and then used "wait and see" strategy. The 13 patients (20.6%) were no response. When analyzed by disease, the success rate of E-VAC therapy in esophageal disease was 78.3% (n=36) and gastric disease was 82.4% (n=14). Life- threatening complication was none. E-VAC related bleeding was observed in two patients but hemostasis could be able to stop bleeding using hemoclip, and one patient had spontaneous hemostasis without intervention.

Conclusions: E-VAC therapy is an effective treatment and safe not only defects after esophageal cancer surgery but also for upper GI transmural defects of various causes.

Keywords: Transmural defect, EndoVac, Endoscopic vacuum therapy

SGI-P29

Irritable bowel syndrome in atrial fibrillation: Novel therapeutic strategy in Asia

Wei Syun Hu

Cardiology, CMUH, Taihung, Taiwan

Background / aims: We seek to characterize the association between atrial fibrillation and irritable bowel syndrome.

Methods: We identify 11,642 cases (atrial fibrillation) and 46,487 sex-, age-, and index year-matched controls (non-atrial fibrillation) from Longitudinal Health Insurance Database. Kaplan-Meier, Cox proportional hazards regression methods and competing risk analysis methods were used to assess the association of atrial fibrillation with outcome of irritable bowel syndrome.

Results: Results: After adjustment for gender, age, comorbidities and medications, patients with atrial fibrillation had a significant higher risk (adjusted hazard ratio = 1.12, $p < 0.01$) to develop irritable bowel syndrome than patients without atrial fibrillation. Compared to participants without atrial fibrillation, those with atrial fibrillation had 1.13-fold ($p < 0.05$) and 1.11-fold ($p < 0.05$) risk of irritable bowel syndrome in female and male subgroup, respectively. Among subjects aged ≥65 years, those with AF had 1.11-fold risk of irritable bowel syndrome than non-AF cohort ($P < 0.01$). Among participants with any one of the comorbidities, those with atrial fibrillation had 1.10-fold risk of irritable bowel syndrome than non-atrial fibrillation cohort ($p < 0.05$).

Conclusions: Conclusion: We report that the presence of atrial fibrillation is associated with greater incidence of irritable bowel syndrome and the association is stronger among female gender, age 65 years or above, and with comorbidities.

Keywords: NOVEL, BIG DATA, AF, GUT, Precise

SGI-P30

Efficacy and safety of novel hemostatic gel in endoscopic sphincterotomy or endoscopic papillectomy: A multicenter, randomized controlled clinical trial

Jin Ho Choi[1], In Rae Cho[1], Sang Hyub Lee[1], Joo Seong Kim[1], Namyoung Park[1], Min Woo Lee[1], Dong Kee Jang[2], Woo Hyun Paik[1], Dong Won Ahn[2], Ji Kon Ryu[1], Yong-Tae Kim[1]

[1]Internal Medicine, Seoul National University Hospital, Seoul, Korea, [2]Internal Medicine, Seoul National University College of Medicine, Seoul Metropolitan Government Seoul National University Boramae Medical Center, Seoul, Korea

Background / aims: Endoscopists may experience several obstacles with traditional hemostasis using the side-viewing duodenoscope for bleeding after endoscopic sphincterotomy (EST) or endoscopic papillectomy (EP). In this randomized controlled trial, we tried to evaluate the efficacy and safety of a novel hemostatic gel for post-EST or post-EP bleeding.

Methods: This multicenter randomized trial was conducted during the period from November 2020 to December 2021 at two tertiary centers in South Korea. Patients who experienced immediate bleeding after EST or EP were enrolled in the study, and achieved primary hemostasis with a novel hemostatic gel or epinephrine spray.

Results: A total of 84 patients were enrolled in this study, and 41 patients in each group were finally analyzed. Hemostatic gel was significantly superior to epinephrine spray for successful primary hemostasis (100% of hemostatic gel, 85.4% of epinephrine spray; P=0.026). Regarding delayed bleeding, no significant difference existed between hemostatic gel (2.4%) and epinephrine spray (7.3%). (P=0.329) Mean hemostatic procedural time was significantly longer for hemostatic gel (3.23 ± 1.94 min) than epinephrine spray (1.76 ± 0.99 min). (P<0.001) There were no differences in adverse events.

Conclusions: The novel hemostatic gel is expected to ensure satisfactory hemostatic results while achieving easier hemostasis for immediate post-EST or post-EP bleeding. (Registered in Clinical Research Information Service;KCT0005607)

Keywords: Post-procedural bleeding, Endoscopic sphincterotomy, Endoscopic papillectomy, Hemostatic gel, Randomized controlled trial

SGI-P31

Closure of the defect after endoscopic papillectomy for reducing postoperative events

Ivan Nedoluzhko, Ekaterina Khon, Kirill Shishin, Lada Shumkina

Operative Endoscopy, Moscow Clinicalscientific Center N.a. Loginov A.s., Moscow, Russian Federation

Background / aims: Endoscopic papillectomy is one of the main treatment options for ampullary adenoma. However, possible complications as postoperative bleeding, perforating could lead to cases that require invasive surgical intervention. In order to decrease the postoperative complication rate, additional methods should be applied

Methods: In 2018 after analysis of conducted work, the standard procedure of endoscopic papillectomy was modified - closure of the defect with haemostatic clips was performed after endoscopic papillectomy. Papillectomy was performed in snare technique. Submucosal injection was performed only for the lateral spreading components of the tumor. Pancreatic stent was routinely placed in order to reduce risk of acute pancreatitis. Hemostasis was performed if needed. Resection defect was closed with haemostatic clips leaving 3-5 mm between the last clip and the stented pancreatic duct

Results: Endoscopic papillectomy was successfully performed in 69 cases, 45 cases (65%) of standard papillectomy and 24 (35%) with the closure of the defect. Postoperative bleeding occurred in 22% cases (n=10) after standard papillectomy and in 8% (n=2) after modified operation. The frequency of perforation after standard procedure was 8% (n=4) and 0% after papillectomy with the closure of the defect

Conclusions: Delayed bleeding is induced by aggressive effect of pancreatic juice on the resected surface. Further haemostasis bears the risk of perforation due to the additional coagulation. Advanced endoscopic equipment allows to close the resection defect, which decreases risks of complication development

Keywords: Papilla, Adenoma, Papillectomy, Clips

SGI-P32

Endoscopic treatment of patients with large bile duct stones

Yuri Teterin, Lomali Generdukaev, Tigran Enrike Rokhas Tadevosyan, Peter Yartcev, Dmitry Blagovestnov

Endoscopy Department, Sklifosovsky Clinical and Research Institute for Emergency Medicine, Moscow, Russian Federation

Background / aims: According to the World Society for Emergency Surgery (WSES) between 10% and 15% of adults in developed countries suffer from cholelithiasis. One of the most common complications of cholelithiasis is choledocholithiasis, which occurs in 20%. Over the last decade, 85-95% of choledocholithiasis cases have been successfully treated with endoscopic techniques such as endoscopic retrograde cholangiopancreatography (ERCP) followed with stones removal. However, in about 15% of patients is difficult to perform stone removal due to presence of large biliary stones. Electrohydraulic and laser contact lithotripsy under SpyGlass control have been actively applied for the last decade in order to improve endoscopic treatment results.

Methods: Between January 2019 and July 2022, in the N.V. Sklifosovsky Research Institute of Emergency Care were treated 706 patients diagnosed with choledocholithiasis who underwent biliary stones removal from the common bile duct. Of them in 57 (8, 1%) patients the use of Dormia basket or Biliary stone extraction baloon was technically unsuccessful due to size of the stones (more than 15 mm in diameter), which required their destruction. Mechanical lithotripsy was used in 35 patients, and electrohydraulic and laser lithotripsy under SpyGlass direct visualization system - in 22 patients.

Results: The efficiency of mechanical lithotripsy was 72%. Complications in this group were observed in 2 patients. In both cases on day 1 after lithotripsy developed acute pancreatitis, which resolved on day 3 with conservative therapy (Clavin-Dindo type 2).

Conclusions: Our study showed the efficacy and safety of electrohydraulic and laser lithotripsy under SpyGlass control in a well-defined group of patients with large bile duct stones.

Keywords: Electrohydrauli□, Laser lithotripsy, SpyGlass

SGI-P33

Endoscopic papillectomy. Largest in Russia single centre experience

Ivan Nedoluzhko, Ekaterina Khon, Kirill Shishin, Lada Shumkina

Operative Endoscopy, Moscow Clinicalscientific Center N.a. Loginov A.s., Moscow, Russian Federation

Background / aims: Ampullary adenoma is the most common benign ampullary tumor. Endoscopic papillectomy gained increasing acceptance as the first line treatment for the vast majority of patients with ampullary adenomas

Methods: A total of 68 patients underwent endoscopic papillectomy between 2014 and 2021. 43 (63%) women □ 25 (37%) men. Inclusion criteria were: tumor diameter less than 4 cm, benign histologic tumor by endoscopic biopsy and no intraductal extension more than 1 cm. Papillectomy was performed in a snare technique using blended current. Submucosal injection was performed only for the lateral spreading components of the tumor. If the lesion could be completely snared, “en block” resection was performed. Pancreatic stent was routinely placed in order to reduce risk of acute pancreatitis. Hemostasis was performed if needed.

Results: Endoscopic papillectomy was successfully performed in all 69 cases (one patient underwent twice). En block resection was completed in 70% of the cases (n=48), piecemeal resection in 30% (n=21). Pancreatic stent was successfully placed in 55 cases (80%). Postoperative complication were bleeding (n=12, 17%), perforation (n=5, 7%), acute pancreatitis (n=4, 6%). Procedure related mortality rate is 2.8 % (n=2). Local recurrence rate occurred in 1 case (1.4%), patient underwent second endoscopic papillectomy. Histopathology reported adenoma in 75.3% (n=52), hyperplastic polyp in 4% (n=3), papillitis in 6% (n=4), adenocarcinoma in 10.1% (n=7), neuroendocrine tumor in 4.3% (3%).

Conclusions: Nowadays endoscopic papillectomy is the less invasive alternative for treatment of ampullary adenoma. Detailed preoperative examination and patient selection is the key for successful endoscopic treatment.

Keywords: Papilla, Adenoma, Papillectomy

SGI-P34

Radiofrequency ablation with silver nanofunctionalized stent for suppression of tissue hyperplasia and bacterial growth in rabbit bile duct

Yubeen Park[1], Dong-Sung Won[2], Sang Soo Lee[1], Jung-Hoon Park[2]

[1]Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea, [2]Biomedical Engineering Research Center, Asan Institute for Life Sciences, Asan Medical Center, Seoul, Korea

Background / aims: Intraductal radiofrequency (RF) ablation combined with placement of a self-expandable metal stent (SEMS) for malignant biliary obstruction has risks such as stent- and heat-induced biliary sludge and restenosis. Here, we investigated the efficacy of a silver nanoparticles (AgNPs)-coated SEMS placement immediately after RF ablation in suppressing thermal damage as well as SEMS-induced bacterial growth and tissue hyperplasia.

Methods: The antibacterial effects of AgNPs- coated SEMSs were evaluated. A total of 12 male New Zealand White rabbits were randomly divided into two groups immediately after RF ablation: the control group received an uncoated SEMS, and the AgNPs group received an AgNPs- coated SEMS. Cholangiography and hematological examination were performed immediately before sacrifice in all rabbits. Histological examination was performed with hematoxylin-eosin and Masson’s trichrome. Immunohistochemistr y analysis was performed about the degree of TUNEL-, HSP 70-, and □-SMA- positive areas.

Results: The AgNPs-coated SEMS significantly inhibited bacterial activity compared to the uncoated SEMS ($p < 0.05$). Stent placement immediately after RF ablation was successfully performed without procedure-related complications in all rabbits. Jaundice was observed in 3 out of 6 (50%) rabbits in the control group. The luminal diameter in the AgNPs group was greater than that in the control group ($p < 0.05$). All hematological levels (AST, ALT, ALP, GGT, and total bilirubin) were lower in the AgNPs group than in the control group. Histological and immunohistochemistr y examination confirmed that all evaluation results were significantly lower in the AgNPs group than in the control group (all $p < 0.05$).

Conclusions: The AgNPs-coated SEMS significantly inhibited tissue hyperplasia and biofilm induced by heat and mechanical damages in the rabbit common bile duct. The RF ablation with nanofunctionalized stent should be a promising therapeutic strategy for the prevention of RF ablation- and stent- related complications.

Keywords: Malignant biliary obstruction, Radiofrequency blation, Self-expandable metal stent, Silver nanoparticle, Tissue hyperplasia

SGI-P35

Outcomes using percutaneous retrievable covered biliary stents for benign biliary strictures

Tim Fotheringham, Marcus Deal, Farrukh Arfeen, Robert Hutchins

Interventional Radiology, Royal London Hospital, Barts Health NHS Trust, London, UK

Background / aims: Benign biliary strictures (BBS) can occur following surgery. BBS can be treated using both percutaneous and endoscopic techniques including serial balloon dilatation, biliary drainage catheters, endoscopically retrievable stents. The aim of the study was to assess the outcomes of BBS treated with percutaneously retrievable covered biliary stents.

Methods: Retrospective review of BBS treated using percutaneously inserted retrievable covered biliary stents between 2007-2021. Data was collected using electronic medical records. Two devices were used; 10mm covered Niti S (Taewong, South Korea) with a monofilament suture attached to the device during the procedure (for percutaneous retrieval) and 10mm Jengu Hilzo stent (BCM, South Korea) which has a monofilament suture already attached. Percutaneous transhepatic biliary drainage was performed with stents placed under fluoroscopic guidance and dilated with a balloon. Following stent insertion an 8F catheter was left to maintain the track and preserve access. The stents were removed percutaneously using the suture after 8-12weeks.

Results: 56 patients were identified during the study period with BBS, mean age in years 62.7 (range 37-86), M:F ratio 26:30. Follow up period, in months, mean = 39 (range 2-92). A total of 104 stents were placed; 94 stents were removed percutaneously, one stent (1%) could not be removed percutaneously, 5 stents had passed uneventfully and there was no attempt to remove 4 stents due to malignant disease progression elsewhere. Stent migration requiring repeat procedures occurred in 4 patients (7.1%), 2 patients were admitted with cholangitis requiring antibiotics, no other complications were identified due to the stent. Primary patency rates at 12 months and 24 months were 91.1% and 82.1% respectively. Secondary patency following repeat stenting was 94.6% with 3 patients requiring surgery.

Conclusions: Benign biliary strictures can be successfully treated percutaneously with retrievable covered biliary stents with a high primary and secondary patency rate.

Keywords: Benign biliary strictures, Covered self expanding metal stent, Percutaneous transhepatic biliary drainage

SGI-P36

Outcomes using percutaneously retrievable covered biliary stents for persistent bile leaks

Tim Fotheringham, Marcus Deal, Farrukh Arfeen, Mohammed Akhtar, Ajit Abrahams

Interventional Radiology, The Royal London Hospital, Barts Health NHS Trust, London, UK

Background / aims: Bile leaks (BL) can occur following surgery. Persistent bile leaks lasting more than week may require percutaneous drainage and endoscopically placed stents. If the BL continues percutaneous transhepatic biliary drainage (PTBD) may be required or surgery. The aim of the study was to assess the outcomes of BL treated using percutaneously retrievable covered biliary stents.

Methods: Retrospective review of BL (lasting over 2 weeks) treated using percutaneously inserted retrievable covered biliary stents between 2009-2021. Data was collected using electronic medical records. Two devices were used during the study period; 10mm covered Niti S (Taewong, South Korea) with a monofilament suture attached to the device during the procedure (for percutaneous retrieval) and the 10mm Jengu Hilzo (BCM, South Korea) which has a monofilament suture already attached. Percutaneous transhepatic biliary drainage was performed and the stents were placed under fluoroscopic guidance and dilated with a balloon. Following stent insertion an 8F catheter was left to maintain the track and preserve access. The stents were then removed percutaneously using the suture after 8-16weeks.

Results: 24 patients were identified, mean age in years = 64.3 (range 38-89), M:F ratio 13:11. Follow up period, mean = 33 months (range 2.2 months to 9 years). A total of 46 stents were placed. Additional procedures for stent repositioning were required in 5 patients (20.8%) for persistent leak 3 patients (12.5%) or migration 2 patients (8.3%). Stent placed for a mean of 103 days (range 42-364 days). All stents were successfully removed percutaneously. BL was successfully treated in 23 patients (95.8%). One patient developed postoperative small bowel obstruction with reflux into the roux loop preventing the fistula from healing. 1 patient developed a biliary stricture after 29 months requiring reintervention.

Conclusions: Persistent bile leaks can be successfully treated with percutaneous retrievable covered biliary stents.

Keywords: Bile leak, Covered self expanding metal stent, Percutaneous transhepatic biliary drainage

SGI-P37

Efficacy of Multi-Hole Self-Expanding Metallic Stent for the treatment of malignant distal biliary obstruction

Tigran Enrike Rokhas Tadevosyan, Yuri Teterin, Peter Yartcev

Department of Endoscopy, Sklifosovsky Research Institute for Emergency Medicine, Moscow, Russian Federation

Background / aims: Currently, Uncovered Self-expandable metallic stents (SEMS) and Fully Covered SEMS are commonly used for the management of biliary obstruction. However, Uncovered SEMS is prone to obstruction by tumor ingrowth, leading to short patency, and Fully Covered SEMS is at risk of migration. Also, when Fully Covered SEMS are placed across the pancreatic and cystic orifices, it may block the bile flow from the side branches, causing pancreatitis and cholecystitis. This determines the relevance of the issue of improving the construction of stents. Multi-hole SEMS were developed in order to overcome those problems and combine the benefits of those conventional stents. The aim of the study is to evaluate the efficacy of Multi-hole SEMS.

Methods: The current study included 52 patients with malignant biliary obstruction. The patients were divided into 2 groups. The first group (n = 26) included patients who underwent biliary stenting using Multi-hole SEMS, the design characteristic of which is the presence of microperforations that can prevent stent migration, tumor overgrowth and reduce the risk of blocking the main pancreatic duct. The second comparison group (n=26) included patients who underwent stenting with Fully Covered SEMS. The clinical success was defined as decrease in conjugated bilirubin levels during the first 3-4 days and clinical improvement.

Results: The procedure of biliary stenting was successful in both groups. In the second group following complications were observed: 3 patients (12%) with intact gallbladder developed acute cholecystitis, 4 patients (15,3%) developed acute pancreatitis, 4 patients (15,3%) had stent dislocation. In the group where Multi-Hole SEMS were used, 2 patients (8%) developed acute cholecystitis, 2 patients had acute pancreatitis (7,7%), and there was no stent dislocation in all cases.

Conclusions: Our study demonstrated that the use of Multi-Hole SEMS can reduce the frequency of such complications as acute pancreatitis and acute cholecystitis and can prevent stent migration.

Keywords: ERCP, Multi-Hole, Biliary obstruction, Biliary stenting

SGI-P38

Comparison between three types of needles for endoscopic ultrasound-guided tissue acquisition of pancreatic solid masses: A multicenter observational study

Min Jae Yang[1], Se Woo Park[2], Jaihwan Kim[3]

[1]Department of Internal Medicine, Ajou University, Suwon, Korea, [2]Department of Internal Medicine, Hallym University, Hwaseong, Korea, [3]Department of Internal Medicine, Seoul National University, Seongnam, Korea

Background / aims: It is debatable which needle has clear superiority of diagnostic performance in endoscopic ultrasound (EUS)-guided fine needle biopsy (FNB) of solid pancreatic masses. This study aimed to compare the performance of three needles and determine the variables that affect the diagnostic accuracy.

Methods: From March 2014 to May 2020, 746 patients with solid pancreatic masses who underwent EUS-FNB using three types of needles (Franseen needle, Menghini-tip needle, and Reverse-bevel needle) were retrospectively reviewed. Multivariate analysis using a logistic regression model was used to identify factors related to diagnostic accuracy.

Results: There were significant differences between the groups regarding the procurement rate of the histologic and optimal quality cores (Franseen vs. Menghini-tip vs. Reverse-bevel: 98.0% [192/196] vs. 85.8% [97/113] vs. 91.9% [331/360], P<0.001 and 95.4% [187/196] vs. 65.5% [74/113] vs. 88.3% [318/360], P<0.001, respectively). The sensitivity and accuracy using histologic samples were 95.03% and 95.92% for Franseen, 82.67% and 88.50% for Menghini-tip, and 82.61% and 85.56% for Reverse-bevel needles, respectively. In direct comparison between the needles using histologic samples, the Franseen needle showed significantly superior accuracy than the Menghini-tip (P=0.018) and Reverse-bevel needles (P<0.001). Multivariate analysis indicated that tumor size ≥2 cm (odds ratio [OR] 5.36, 95% confidence interval [CI] 3.40-8.47, P<0.001) and fanning technique (OR 1.70, 95% CI 1.00-2.86, P=0.047) were significantly associated with an accurate diagnosis.

Conclusions: EUS-FNB using the Franseen needle enables the acquisition of a larger and more adequate histologic core tissue and achieves an accurate histological diagnosis when using the fanning technique.

Keywords: Endoscopic ultrasound, Pancreatic solid tumor, Biopsy, Diagnostic accuracy, Needle

SGI-P39

EUS-guided tissue acquisition using novel torque technique are comparable with fanning technique in solid pancreatic lesions: Multicenter, randomized trial

Min Jae Yang[1], Kyong Joo Lee[2], Se Woo Park[2]

[1]Department of Gastroenterology, Ajou University, Suwon, Korea, [2]Department of Internal Medicine, Hallym University, Hwaseong, Korea

Background / aims: The torque and fanning technique allows for multiple areas within pancreatic lesions to be targeted using different maneuvers and can, hence, enhance diagnostic outcomes. We compared the diagnostic performance of endoscopic ultrasound-guided fine-needle biopsy (EUS-FNB) for pancreatic masses using the torque and fanning technique.

Methods: This multicenter randomized trial enrolled a total of 160 consecutive patients who underwent EUS-FNB for solid pancreatic tumors using either the torque or fanning technique. Three passes were permitted for each lesion, and the technique sequence was randomly assigned by either torque first or fanning first with the standard technique as a reference.

Results: The median quality score of the histological samples was significantly higher in the torque and fanning group than that in the standard group (P <0.001). Furthermore, the torque technique provided improved sensitivity of 93.38% and accuracy of 94.30%. The standard technique provided diagnostic sensitivity of 68.84% and accuracy of 72.96%, while the fanning technique showed sensitivity of 91.85% and accuracy of 93.04%.

Conclusions: The new torque technique enables the acquisition of better quality samples and can potentially increase the diagnostic outcomes in EUS-FNB of pancreatic solid masses, with same recommendations as those for the fanning technique.

Keywords: Endoscopic ultrasound-guided fine-needle biopsy, Fanning, Solid pancreatic lesion, Torque

SGI-P40

Prolonged patency of fully covered self-expandable metal stent with an externally anchored plastic stent in distal malignant biliary obstruction

Jung Won Chun[1], Sang Myung Woo[1], Mira Han[2], Min Woo Lee[3], Jin Ho Choi[3], In Rae Cho[3], Woo Hyun Paik[3], Woo Jin Lee[1], Ji Kon Ryu[3], Yong-Tae Kim[3], Sang Hyub Lee[3]

[1]Center for Liver and Pancreatobiliary Cancer, National Cancer Center, Goyang-si, Korea, [2]Biostatistics Collaboration Team, National Cancer Center, Goyang-si, Korea, [3]Department of Internal Medicine and Liver Research Institute, Seoul National University Hospital, Seoul National University College of Medicine, Seoul, Korea

Background / aims: Fully covered self-expandable metal stents (FCSEMSs) are widely used for endoscopic treatment of distal malignant biliary obstruction (dMBO). However, spontaneous migration is a major concern of FCSEMSs. The present study aimed to assess the efficacy of anchoring an external plastic stent (PS) to a FCSEMS in promotion of stent patency.

Methods: A multicenter retrospective cohort study was performed with dMBO patients to compare stent patency between FCSEMS and FCSEMS with an externally anchored plastic stent (EPS). For external anchoring, a 7-Fr double-pigtail PS was placed in the bile duct, then a FCSEMS was inserted side-by-side. We adopted the Inverse probability of treatment weighting (IPTW) based on the propensity scores to address the issue of heterogeneous patient characteristics.

Results: Among a total of 185 dMBO patients, 65 had FCSEMS alone and 120 had FCSEMS with an EPS. The median stent patency was significantly longer in the FCSEMS with an EPS than in the FCSEMS only both before (342 days vs. 240 days, P = 0.037) and after the IPTW adjustment (365 vs. 231 days, P = 0.022). The rate of stent migration was significantly lower in the FCSEMS with an EPS than the FCSEMS only (10.8 vs. 27.7%, P = 0.004). There was no significant difference in the rates of stent occlusion and adverse events between the two groups.

Conclusions: A novel and simple technique of anchoring an external PS may decrease the risk of FCSEMS migration and prolong stent patency without significantly increasing the adverse events rate in dMBO.

Keywords: Cholestasis, Extrahepatic, Cholangiopancreatography, Endoscopic Retrograde

SGI-P41

Hemobilia from above papilla level and endoscopic hemostasis using fully covered self-expandable metal stent

Junyeol Kim, Sang Hyub Lee, Jin Ho Choi, Min Woo Lee, Myoeng Hwan Lee, In Rae Cho, Woo Hyun Paik, Ji Kon Ryu, Yong-Tae Kim

Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Korea

Background / aims: Hemobilia can be caused by various reasons and can cause fatal clinical events in case of unsuccessful hemostasis. Hemobilia often requires advanced treatments with endoscopic hemostasis, transarterial embolization, or surgery. But, the management of hemobilia is often cumbersome and there were few effective treatment modalities except for post-endoscopic sphincterotomy bleeding. Recently, endoscopic hemostasis showed promising efficacy with the advent of hemostatic modalities including self-expandable metal stent (SEMS). In this study, we tried to evaluate the association between successful endoscopic hemostasis for hemobilia from above papilla level and other clinical factors.

Methods: Patients who underwent CT angiography or conventional diagnostic or therapeutic angiography in addition to ERCP in Seoul National University Hospital from July 2008 to May 2022 were included. Patients whose bleeding was not originated from biliary tract and post-endoscopic sphincterotomy bleeding were excluded. Study outcome is successful endoscopic hemostasis.

Results: A total of 34 patients were included in this study. A total of 24 patients received endoscopic hemostasis procedure as initial hemostasis, and 10 patients received arterial embolization as initial hemostasis. In initial endoscopic hemostasis group, fully covered SEMS, uncovered SEMS, and plastic stent were used for endoscopic hemostasis in 9, 1, and 14 patients, respectively. The successful endoscopic hemostasis rate were 70% for SEMS, 84% for plastic stent. Among 5 patients who failed endoscopic hemostasis, 4 patients underwent successful rescue transarterial embolization. In initial arterial embolization group, the success rate of hemostasis was 100%.

Conclusions: Hemobilia from above papilla level is an uncommon and a potentially life-threatening condition. Transarterial embolization is the treatment of option. For carefully selected patients and by an experienced endoscopist, endoscopic hemostasis using fully covered self-expandable metal stent can be a treatment option.

Keywords: Hemobilia, Fully covered self-expandable metal stent

SGI-P42

Diagnostic performance of the 20G forward-bevel needle (ProCore®) for various pancreatic lesions: Comparison of PDAC with non-PDAC

Junghwan Lee, Tae Jun Song, Dong Wook Oh, Do Hyun Park, Sang Soo Lee, Dong Wan Seo, Sung Koo Lee

Department of Gastroenterology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Korea

Background / aims: EUS-guided fine- needle biopsy (EUS-FNB) has been suggested for obtaining high quality samples with preserved tissue architecture. Various pancreatic lesions, such as autoimmune pancreatitis, neuroendocrine tumor, and solid pseudopapillary neoplasm, requires histologic diagnosis with immunohistochemistr y. The 20G forward- bevel needle (ProCore®) has been designed to balance good flexibility with a large bore to improve tissue acquisition. The data regarding diagnostic performance of the 20G core needle for non-pancreatic ductal adenocarcinoma (PDAC) disease are scant. The aim of this study is to assess and compare the diagnostic performance of the 20G core biopsy needle for PDAC and non-PDAC disease.

Methods: This retrospective analysis included 70 patients who underwent EUS-FNB for pancreatic mass with 20G forward-bevel needle from Jan. 2021 to July. 2022. The clinical outcomes and diagnostic performance of the 20G core needle on PDAC group and non- PDAC group were evaluated.

Results: A total of seventy- patients with PDAC (n=34) and non-PDAC disease (n=36) were included in the study. Final diagnosis of non-PDAC disease was autoimmune pancreatitis (N=18), neuroendocrine tumor (N= 8), solid pseudopapillary neoplasm (N= 6), chronic pancreatitis (N= 2), intraductal oncocytic papillary neoplasm (N= 1), and metastatic renal cell carcinoma (N= 1). For PDAC group, diagnostic accuracy and sensitivity were 97.1% and 97.1%, respectively. For non- PDAC group, diagnostic accuracy and sensitivity were 83.3% and 81.2%. Diagnostic accuracy and sensitivity were 72.2% and 75.0% for autoimmune pancreatitis, 88.9% and 87.5% for neuroendocrine tumor, and 100% and 100% for solid pseudopapillary neoplasm with the 20G core needle.

Conclusions: 20G Procore needle provided high overall diagnostic accuracy and sensitivity for both PDAC group and non-PDAC group. Use of the 20G core needle was technically feasible, safe, and efficient for various pancreatic lesions.

Keywords: Endoscopic ultrasound-guided biopsy, Fine-needle biopsy (FNB), 20G forward-bevel needle, Procore needle

SGI-P43

Effect of preventive use of antibiotics before percutaneous hepatic puncture biliary drainage on postoperative biliary infection

Zheyu Jiang, Lizhou Wang

College of Medical Imaging, Guizhou Medical University, Guiyang Guizhou Province, China

Background / aims: To investigate whether there is an effect of preventive use of antibiotics before percutaneous transhepatic cholangial drainage (PTCD) on postoperative biliary tract infection , and the factors influencing the occurrence of biliary tract infection after PTCD for obstructive jaundice.

Methods: First, 325 patients who underwent PTCD treatment from June 2016 to June 2021 in Affiliated Hospital of Guizhou Medical University and other hospitals were selected as study subjects. And then,according to whether they've used antibiotics prophylactically 0.5-2 hours before the surgery, 25 patients who used antibiotics prophylactically were considered as the observation group and 300 patients who did not use antibiotics prophylactically were considered as the control group. Third, the basic conditions of patients in both groups and the occurrence of postoperative symptoms and infections were compared, and the influencing factors of postoperative PTCD infections were analyzed by single-factor and multi-factor logistic regression.

Results: There was no statistically significant difference in the basic conditions of the patients in the two groups. The rates of postoperative biliary tract infection in the two groups were 8.0% and 20.7%, respectively, with no statistical difference (X2=2.34,p=0.13>0.05). Univariate analysis showed that drainage method, preoperative hemoglobin, preoperative total bilirubin, and preoperative PT were associated with postoperative biliary tract infection in PTCD. Binary logistic multifactorial analysis concluded that preoperative hemoglobin and internal and external drainage were independent risk factors for postoperative complications of infection.

Conclusions: There is no significant correlation between the effect of prophylactic application of antibiotics on the rate of biliary tract infection after PTCD. The lower the preoperative hemoglobin is, the more biliary tract infection after PTCD is prone to happen, and the use of internal and external drainage also lead to biliary tract infection after PTCD.

Keywords: Antibiotics, PTCD, Infection

SGI-P44

Comparison of outcomes of different self-expandable metal stents for EUS-guided hepaticogastrostomy: Fully covered and partially covered metal stent

Tae Jun Song[1], Seong Hyun Cho[2], Seong Je Kim[3]

[1]Department of Internal Medicine, Ulsan University College of Medicine, Seoul, Korea, [2]Department of Internal Medicine, Ulsan University College of Medicine, Seoul, Korea, [3]Department of Internal Medicine, Ulsan University College of Medicine, Seoul, Korea

Background / aims: For malignant biliary obstruction, endoscopic ultrasound-guided hepaticogastrostomy (EUS-HGS) has been the alternative option if endoscopic retrograde cholangiopancreatography fails. However, there have been little data on the dedicated devices. In this study, we compared the clinical outcomes between two different self- expandable metal stents for EUS-HGS.

Methods: We reviewed the prospectively collected data of consecutive patients with malignant hilar obstruction who underwent EUS-HGS using fully covered metal stent (FCSEMS) or partially covered metal stent (PCSEMS). Technical and clinical success rate, early adverse events, late adverse events, and stent patency duration were analyzed.

Results: A total of 77 patients (40 FCSEMS, 37 PCSEMS) were analyzed. Both groups did not show significant differences in technical success (FCSEMS, 100 % vs. PCSEMS 100%; P = 0.33), clinical success (82.5% vs. 86.5%; P = 0.63), early adverse events (7.5% vs. 2.7%; P = 0.34), and stent related late adverse events (12.5% vs. 18.9%; P = 0.44). During follow-up, both groups show similar patency duration (FCSEMS 78.5 days [IQR ,31.25- 210.0] vs. PCSEMS 90.0 days [IQR,36.5- 116.5]: P = 0.51)

Conclusions: EUS-HGS is a method that can be usefully used when ERCP intervention fails. In EUS-HGS, there were no significant differences in technical and clinical success rates, early and late adverse event rates, and patency period according to the type of metal stent.

Keywords: EUS-HGS, Fully covered metal stent, Partially covered metal stent

SGI-P45

Utility of predictors for preoperative choledocholithiasis risk and establishment of reference point for predictors in patients with calculous cholecystitis or symptomatic cholelithiasis

Junghun Woo, Kihyun Ryu, Youngwoo Choi, Youngwoo Kang, Kyuchan Huh, Taehee Lee, Sunmoon Kim, Hoonsup Koo, Daesung Kim, Sanghyuk Lee, Hyeyeon Jeon

Gastroenterology, Konyang University Myunggok Medical Research Institute, Gasuwon-dong, Seo-gu, Daejeon, Korea

Background / aims: The American Society for Gastrointestinal Endoscopy (ASGE) updated clinical guideline for diagnosis and management for patients with symptomatic cholelithiasis or calculous cholecystitis based on clinical predictors in 2019. In our study, we aimed to evaluate utility of predictors for Korean according to gender, and to establish Korean laboratory predictors' cut-off value for assessing risk of choledocholithiasis and manage calculous cholecystitis or symptomatic cholelithiasis.

Methods: A total of 3,188 patients underwent laparoscopic cholecystectomy. Five laboratory tests (ALT, AST, r-GT, ALP, bilirubin, total) and age were obtained before cholecystectomy. Sensitivity, specificity, odds ratio (OR), positive predictive value, negative predictive value were obtained based on the ASGE guideline predictors. In addition, we established the cut-off value of laboratory test and age using ROC curve and assessed utility of cut-off values.

Results: Among 3,188 patients, 1,636 men and 1,552 women were identified. In the case of males, the sensitivity of age over 55 years was 18.1%, its specificity was 70.6%, and OR was 0.531. In females, the sensitivity of age over 55 years was 26.0%, its specificity was 59.8%, and OR was 0.522. The cut-off value of predictors for choledocholithiasis in Korea were 70 years of age, ALT 44.5 U/L, AST 29.5 U/L, r-GT 118.5 U/L, ALP 92.5 U/L and bilirubin, total 1.04 mg/dl for men, and 74 years old, ALT 31.5 U/L, AST 31.5 U/L, r-GT 82.5 U/L, ALP 80.5 U/L and bilirubin, total 0.66 mg/dl, for women. For men, the sensitivity of age over 70 years old was 50.4%, specificity 66.9%, OR 2.048, and for women, sensitivity of those over 74 years old was 51.6%, specificity 73.2%, OR 2.911.

Conclusions: In our study, it was recommended that the predictors' reference point of the ASGE guideline for Korean patients with cholelithiasis or cholecystitis should be adjusted and predictors for choledocholithiasis should be classified by the gender.

Keywords: Choledocholithiasis, Choledocholithiasis predictor, ASGE guideline, Korean reference point

SGI-P46

The effect of endoscopic gallbladder drainage in the prevention of biliary complications in patients with concurrent gallbladder and common bile duct stones

Myeong Hwan Lee, Woo Hyun Paik, Min Woo Lee, Jin Ho Choi, In Rae Cho, Sang Hyub Lee, Ji Kon Ryu, Yong-Tae Kim

Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Korea

Background / aims: Cholecystectomy is recommended for all patients with concurrent common bile duct (CBD) and gallbladder (GB) stones to prevent recurrent biliary complications, unless there are specific reasons for considering surgery inappropriate. The aim of this study was to assess the role of GB stenting with ERCP in surgically unfit patients with CBD and GB stones.

Methods: A total of 53 patients attempted to insert endoscopic retrograde gallbladder drainage (ERGBD) during ERCP for CBD stone removal between September 2017 and December 2021. In 45 patients who succeeded ERGBD insertion, we excluded 9 patients with malignant biliary obstruction, benign stricture, and absence of GB stones. The observation group was consisted of patients who removed CBD stones only without cholecystectomy or percutaneous cholecystostomy. Primary outcome was recurrence of any biliary complications. Cumulative incidence rate of recurred biliary complication was compared between two groups by the Kaplan-Meier analysis and log-rank test.

Results: There were no statistically significant differences in baseline characteristics including age, sex distribution, presence of diverticulum, and comorbidities between ERGBD group and observation group. The mean ERGBD maintenance period was 18.5 months. The incidences of any recurred biliary complications (ERGBD group 27.8% vs observation group 32.7%) were similar between the two groups. However, recurrence of CBD stones was significantly more frequent in observation group than in ERGBD group (20.7% vs. 5.6%, p=0.022). Other biliary complications, including acute cholecystitis (10.0% vs. 8.3%), acute cholangitis (9.3% vs. 5.6%), and biliary colic (6.0% vs. 5.6%) did not show significant differences.

Conclusions: In patients with concurrent CBD and GB stones who are unfit for cholecystectomy, ERCP with ERGBD may reduce the recurrence of CBD stones. Further studies comparing ERGBD and cholecystectomy would be warranted.

Keywords: Endoscopic retrograde gallbladder drainage, Common bile duct stone, Gallbladder stone, Biliary complication, Cholecystectomy

SGI-P47

The role of endoscopic ultrasound-guided fine needle aspiration and biopsy in diagnosing autoimmune pancreatitis: A single center experience

Yun Je Song, Tae Jun Song

Gastroenterology, University of Ulsan, Asan Medical Center, Seoul, Korea

Background / aims: After developing international consensus diagnostic criteria (ICDC) for Autoimmune pancreatitis (AIP) in 2011 , it can be diagnosed more clearly by distinctive clinical, serological and histological features and by effectiveness of steroid therapy. And the role of endoscopic ultrasound-guided fine needle aspiration and biopsy (EUS- FNA/B) is increasing for the pancreatic tissue acquisition. This study aimed to share experience of EUS-FNA/B for diagnosing AIP type 1 and 2 in a single center.

Methods: A retrospective review of medical records was performed on 137 patients who underwent EUS-FNA/B among 321 patients diagnosed with AIP from July 2004 to March 2022. We analyzed rates of diagnostic yield for the histologic criteria of AIP and histologic tissue procurement.

Results: Among 137 AIP patients who underwent EUS- FNA/B, 104 (75.9%) patients diagnosed with type 1 AIP (definite 96 [92.3%] and probable 8 [7.7%]) and 18 (13.2%) with type 2 AIP (definite 13 [72%] and probable 5 [28%]), and 15 (10.9%) with AIP NOS. According to histologic criteria of ICDC, in the Type 1 AIP group, lymphoplasma cell infiltration was observed in 82 (79%) patients, IgG4+ plasma cells(>10 / HPF) in 89 (85.5%) patients, storiform fibrosis in 69 (61.5%) patients, and obliterative phlebitis in 11 (10.5%) patients, respectively. And the yield of level 1 histologic criteria for type 1 AIP was 64 (61.5%) patients, level 2 was 15 (14.4%) patients, and level 1+2 was 79 (76%) patients. In the Type 2 AIP group, granulocytic epithelial lesion in 13(72.2%) patients, and neutrophil infiltration in 6(33.3%) patients were found.

Conclusions: With the development of technology and equipment, the performance of endoscopic ultrasound-guided biopsy in diagnosing AIP is getting better and its role is increasing. So it is strongly recommended to obtain the suggestive findings of AIP through EUS guided FNA/B.

Keywords: AIP, EUS, Autoimmune pancreatitis, FNA/B

SGI-P48

Severity of thrombocytopenia with different grades of esophagel varices in cirrhotic patients

Uong Panha, Chey Vitihiarithy, Kang Khounthai, Un Seiha, Unn Keoseyla, Khuon Viseth, Ny Tharuom, Mon Panha, Kann Sovannvireak, Kaing Kimyi, Chhit Dimanche, Um Sokchay, Nov Neang, Chay Kimpav, Sou Syphana

Gastroenterology, Khmer Soviet Friendship Hospital, Phnom Penh, Cambodia

Background / aims: The Oesophageal varices (EVs) are one of the most common complications of liver cirrhosis and is the consequent of portal hypertension. This study is to determine the correlation between the severity of thrombocytopenia and the presenting of EVs.

Methods: This was a retrospective, descriptive, analytic and monocentric study, which was carried out at Gastroenterology Department, KSFH, Phnom Penh, Cambodia from 1st September 2020 to 31st January 2021. All patients were diagnosed as liver cirrhosis by clinic, biology and ultrasound. All data were registered and were analysed by SPSS program version 23.

Results: 303 among 1445 patients were suggested for variceal screening. Male was predominant with sex ratio F/M (1/2.03). Patients' age varied between 21 and 80 years old, with the mean age of 55 ± 11 years old. 199 patients (66%) were found with EVs, while EVs grade 1 and 2 without red signs were predominated, accounting to 22.8% and 19.5% respectively. The majority of the patients with platelet count between 50-99 giga/l had EVs vs platelet count > 150 giga/l had no EVs (P < 0.0001). The cut-off level of platelet with EVs was 123 giga/l with 75% sensitivity and 65% specificity and with large varices was 105 giga/l with 70% sensitivity and 63% specificity.

Conclusions: Thrombocytopenia is a non-invasive parameter with a high accuracy for the prediction of EVs. The severity of thrombocytopenia increased as the grading of EVs increased. Thus, it can assist in triaging cirrhotic patients for endoscopy to identify EVs.

Keywords: Liver Cirrhosis, Portal Hypertension, Esophageal Varices, Thrombocytopenia, Esophagogastroduodenoscopy

SGI-P49

CHA 2 DS 2-VASc score in the prediction of ischemic bowel disease among patients with atrial fibrillation

Wei Syun Hu

Cardiology, CMUH, Taihung, Taiwan

Background / aims: This study aimed to evaluate the predictive role of CHA2DS2-VASc score specifically for the development of ischemic bowel disease (IBD) among atrial fibrillation (AF) patients.

Methods: Methods: Using a nationwide dataset, an AF cohort was established. The study participants were followed up from the index date until they withdrew from the health insurance system, the occurrence of IBD or until the end of 2011. The hazard ratios (HRs) and 95% confidence intervals (CIs) were examined by Cox models to present the subsequent risk of IBD among AF patients by CHA2DS2-VASc score. The area under the receiver operating characteristic (ROC) curve was used to assess the predictive power of CHA2DS2-VASc score for IBD development among AF patients.

Results: Results: The cumulative incidence of IBD was higher for AF patients with a CHA2DS2-VASc score≥2 than those with a CHA2DS2-VASc score<2 by 2.30% (p<0.001) at the end of follow-up. After adjustment for hyperlipidemia, chronic obstructive pulmonary disease, and chronic kidney disease, the AF patients with a CHA2DS2-VASc score≥2 had a 3.35 times higher risk for IBD development compared to those with a CHA2DS2-VASc score<2 [adjusted HR (aHR)=3.35, 95% CI=2.71-4.13]. Among AF patients, the C-statistic of the CHA2DS2-VASc score as a predictor of IBD was 0.56 (95% CI=0.55-0.57).

Conclusions: Conclusions: In conclusion, the study is the first to investigate the predictive role of CHA2DS2-VASc score specifically for IBD development among AF patients. However, the predictive power was relatively low; further studies are necessary to confirm our findings.

Keywords: BIG DATA, Previse, Novel, Significance, Gut

SGI-P50

Different routes of administering EW-7197 versus EW-7197 · HBr for preventing peritoneal adhesion in a rat model

Chu Hui Zeng[1], Song Hee Kim[1], Dae-Kee Kim[2], Ji Hoon Shin[3], Jung-Hoon Park[1]

[1]Biomedical Engineering Research Center, Asan Institute for Life Sciences, Asan Medical Center, Seoul, Korea, [2]Ewha Drug Design House, Ewha Women's University, Seoul, Korea, [3]Department of Radiology and Research Institute of Radiology, Asan Medical Center, Seoul, Korea

Background / aims: The relatively low aqueous solubility of EW-7197 that was administered orally may have affected the desired concentration in the systemic circulation for treating peritoneal adhesion. This study aimed to compare the efficacy of different routes of administering EW-7197 and its newer version, EW-7197 · HBr, with improved aqueous solubility for inhibiting peritoneal adhesion in a rat model.

Methods: After peritoneal adhesion induction, 30 male Sprague–Dawley rats were randomly divided into five groups with six rats in each: group A, sham control; group B, orally administered 25 mg/kg of EW-7197 · HBr for 7 d; group C, locally administered 25 mg/kg of EW-7197 · HBr; group D, orally administered 20 mg/kg of EW-7197 for 7 d; and group E, locally administered 20 mg/kg of EW-7197. Gross examination, histological (hematoxylin and eosin and Masson's trichrome staining), and immunohistochemical analyses (Ki-67 and □-SMA) were performed to evaluate the efficacy of both drugs.

Results: All procedures were technically successful. All treatment groups, except for group C, showed significantly reduced incidence, quality, tenacity, fibrosis, and collagen deposition scores and lowered expressions of Ki-67– and □-SMA–positive cells of peritoneal adhesions compared with group A. When comparing between groups, all scores were significantly lower in group B than in group C (all P < 0.001), while no significant difference was noted in any of the scores between groups D and E or B and E (all P > 0.05).

Conclusions: Orally administering EW-7197 · HBr and both orally and locally administering EW-7197 significantly prevented peritoneal adhesion formation, and orally administering EW-7197 · HBr was the most effective overall.

Keywords: EW-7197, Aqueous solubility, Route of drug administration, Peritoneal adhesion

SGI-P51

Optimising conscious sedation using EEG BIS monitoring

Alexander Oh[1], Naushad Karim[1], Andy Pitt[1], Scott Hodgetts[1], Gregory Royle[1], Liam Maxfield[1], Damian Mullan[1], Derek Edwards[2], Hans-Ulrich Laasch[2]

[1]Radiology, The Christie Hospital , Manchester, UK, [2]Minnova Medical Foundation, CIC, Wilmslow, UK

Background / aims: To demonstrate the benefits of EEG bispectral index sensor (BIS, Medtronic) guidance in optimising safe administration of sedation and reducing the risk of over-sedation. To assess the level of adherence to an updated sedation protocol implemented in early 2021.

Methods: IR cases from April to December 2021 were retrospectively reviewed. Eligible cases had to have undergone conscious sedation and have essential intra-procedure monitoring documents available. Patients received 4L/min of oxygen via nasal cannula, prior to titration of midazolam and fentanyl by a trained interventional nurse, dropping the BIS reading to a target of 80-85. Vital signs, including capnography and oximetry were monitored continuously and further sedo-analgesic increments were administered to maintain the procedural sedation as per BIS. If oxygen saturations dropped below 92%, airway management and sedation reversal was required. As a service audit, IRB approval was waived.

Results: Post-screening, 150 cases were included in the study with gastrostomy (22%), oesophageal stent insertion (19.3%), and oesophageal dilatation (18.7%) being the 3 commonest procedures. Mean baseline and procedural BIS was 89.8 (±9.9) and 81.3 (±9.1), respectively. All oxygen saturation readings remained above 92%. Therefore, no airway management or reversal agents were required. 11 out of 14 standards were met with some minor documentation issues noted.

Conclusions: Overall adherence to the new protocol was satisfactory, but sedation accuracy was 100%. BIS monitoring allows an objective assessment whether sedo-analgesic agents need to and can safely be administered to maintain optimal sedation. Furthermore, it helps predict the likelihood of over-sedation and avoids the need for reversal agent.

Keywords: Conscious sedation, Bispectral index sensor, Electroencephalogram, Safety

SGI-P52

Evaluation of efficacy and resorption of embolic agents in rat and porcine embolization model

Yu Su Yeol[1], Jin Hee Maeng[1], Hui-Jin Lee[1], Daesung Lee[1], Li Yi Xian[1], Eunhye Lee[2]

[1]Development Dept., Nextbiomedical Co., Ltd., Incheon, Korea, [2]Research & Development Dept., Utah-inha Dds & Advanced Therapeutics Research Center, Incheon, Korea

Background / aims: The aim of this study was to evaluate the embolic performance and resorption time of Nexsphere™-F, fast resorption embolic agent, using two animal models.

Methods: To evaluate the embolic performance and resorption time of the Nexspehre™-F, the hepatic artery of pig (n=2) was embolized by injecting Nexspehre™-F using Transarterial Embolization (TAE). The recanalization of embolized blood vessel was observed using C-arm (Arcadis Varic, Siemens Healthineers) 2 hours after embolization. In the rat model, the portal vein toward the right liver lobe of rat (n=24) was embolized with Nexsphere™-F, and the rats were autopsied after 0, 0.5, 1, 2, 4 and 6 hours for histopathological observation of Nexsphere™-F in the blood vessels.

Results: In porcine study, it was confirmed by C-arm that all porcine livers were successfully embolized with Nexsphere™-F. In all animals, the embolic vessels were recanalized within 2 hours and it was confirmed through histopathological observation that the embolic material did not remain in the blood vessel. In the rat study, it was confirmed through H&E images that Nexsphere™-F was rapidly resorbed about 2 hours after embolization. There were no necropsy findings related hemostatic article administration.

Conclusions: In this study, the of embolic performance and resorption time of Nexsphere™-F were confirmed in two animal models. Based on these results, Nexsphere™-F can be considered as an embolic agent suitable for temporary embolization.

Keywords: Resorbable embolic agent, Vascular Embolization, Liver, SD rat, Porcine

SGI-P53

A novel m5C methylated lncRNA NR033928 promotes gastric cancer progression by promoting GLS mediated glutamine metabolism

Fang Lang, Xu Zekuan

General Surgery Department, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China

Background / aims: Dysregulated lncRNAs participate in a variety of biological processes in cancer. Abnormal m5C methylation has been proved to be closely related with gastric carcinogenesis, progression and prognosis. However, to date, lncRNAs associated with m5C methylation have not been researched.

Methods: A large sample sequencing was performed in 24 pairs gastric cancer and their adjacent normal tissues. Meanwhile, m5C RNA methylation sequencing was conducted in another 3 pairs GC samples compared to normal tissues. Combing these two sequencing results, we identified a critical lncRNA NR_033928 with high expression in GC and m5C hypermethylation. RNA pull-down and mass spectrum analysis was utilized to probe related RNA binding proteins. RIP and co-immunoprecipitation assays were used to explore the molecular mechanism within the RBPs and target mRNAs.

Results: We found that NR_033928 was significantly upregulated and abnormally hypermethylated in GC. NSUN2 was proved to mediate the m5C methylation modification of NR_033928 and regulated its expression. NR_033928 regulated proliferation and apoptosis of GC through modulating the expression of GLS in vivo and in virto. NR_033928 promoted the GLS stability through interacting with IGF2BP3/HUR complex to upregulate the expression of GLS. Besides, NSUN2 enhanced the binding ability of IGF2BP3/HUR complex to GLS.

Conclusions: Our results revealed that NSUN2 mediated the m5C methylation of NR_033928 and upregulated its expression. NR_033928 acted as a scaffold of IGF2BP3/HUR protein complex to promote GLS mRNA stability. Hypermethylated NR_033928 promoted GC progression through increasing the expression of GLS.

Keywords: NR_033928, Gastric cancer, NSUN2, Proliferation

SGI-P54

Competency of junior doctors in identifying misplaced nasogastric tubes in the deteriorating patient

Ojoma Emeje, Arjun Thayyil, Iona Bell

Gastroenterology, Maidstone & Tunbridge Wells NHS Trust, Kent, UK

Background / aims: There has been a recent number of nasogastric tube (NGT) related 'never event' in the UK, and assessing the competency of junior doctors in identifying inappropriately placed tubes in a CXR can help avert potential harm to patients; as junior doctors are the first point of contact to deteriorating patients. The aim of our audit is to enhance knowledge of junior doctors in identifying misplaced NG tubes on CXR in a suddenly unwell patient.

Methods: The audit was carried out in a district general hospital in Kent with the focus on foundation doctors. A questionnaire assessing basic skills in identifying an NG tube as per national patient safety agency (NPSA) guidelines was asked.

Results: Information was collated from 22 foundation doctors. 81.8% had been asked to confirm the position of an NG on CXR and only 50% were confident in identifying whether the NG tube was malpositioned on CXR. 14 had received no training with regards to identifying malpositioned NGT on CXR. Only 1 out of 22 recorded all four criteria for identifying malpositioned NG on CXR.

Conclusions: There is a knowledge gap with regards to the foundation doctor's understanding of NGT imaging and trust policy. If an NGT fed patient deteriorates on the ward and a CXR is performed for any reason, doctors should be aware of the potential for misplaced NGTs and be able to recognise such on CXRs that may not be requested for the purpose of confirming NG position.

Keywords: Nasogastric tube, GI radiology

SGI-P55

Retrospective study of epidemiology, clinic and main etiologies of anal pain among 620 patients at Calmette and Khmer Soviet Friendship Hospitals, during a years

Kang Khoun Thai[1], Mak Sopheak[3], Chea Ong[4], Chea Khang[2], Unn Keoseyla[1], Oum Sokchay[1], Un Seiha[1], Nov Neang[1], Uong Panha[1], Mon Panha[1], Kaing Kimyi[1], Kann Sovannvirak[1], Kang Chamroeun[2], Ny Tharuom[1], Chhay Kimpav[1], Khuon Viseth[1], Sann Channa[1], Chey Vithiarithy[1], Sou Syphanna[1]

[1]Gastroenterology Department, Khmer Soviet Friendship Hospital, Phnom Penh, Cambodia, [2]Faculty of Medecine, Institute of Royal Cambodian Armed Forces, Phnom Penh, Cambodia, [3]Hepato Gastro-enterology Departemetn, Calmette Hospital, Phnom Penh, Cambodia, [4]Hepato Gastro0enterology Department, Presh Kosamak Hospital, Phnom Penh, Cambodia

Background / aims: Anal pain is the most common of chief complaint in proctology consultation. Three main etiologies are a fissure, abscesses or thrombosed hemorrhoid. The diagnosis and the management of anorectal disease is commonly base on the proctology examination.

Methods: This study was the retrospective review of 620 of patients with anal pain whom came to do proctology consultation. It was conducted in two proctology center in Phnom Penh, during the period of 2 years from 1st January 2016 to 31st December 2017.

Results: Anal pain was the main chief complaint (33.39%), Women were more affected. The mean age was 35.55 ± 12.914 years. The three main etiology was anal fissure, thrombosed external hemorrhoid and anal abscesses or fistula (59.2%, 18.9% and 10% respectively). Rectal bleeding was dominantly associated in anal fissure. Perception ball of anus or something prolapsed was usually described in thrombosed external hemorrhoid. Perception ball of anus with anal discharge or oozing was pathognomonic in anal abscesses or fistula. 15.2% of patients need the surgical treatment.

Conclusions: Anal pain was the main chief complaint of proctology consultation it affected dominantly in women. The main etiologies were anal fissure, thrombosed external hemorrhoid and anal abscesses or fistula. Constipation have related only in anal fissure. Some of patients needed the surgery.

Keywords: Anal pain, Anal fissure, Thrombosed external hemorrhoid, Anal abscesses or fistula, Surgery

SGI-P56

Usage of POEM for the treatment of achalasia in patients older 60 years

Ivan Nedoluzhko, Ivan Kanishchev, Kirill Shishin, Lada Shumkina

Operative Endoscopy, Moscow Clinical Scientific Center Named after A.s.loginov, Moscow, Russian Federation

Background / aims: POEM is effective method of treatment patients with achalasia. In terms of effectiveness, this surgical intervention is comparable to the Geller's operation. It has a number of advantages which associated with a shorter duration of surgery, fewer hospital treatment periods and complications. The usage of this operation in patients over 60 years with chronic diseases is questioned.

Methods: Based on the MCSC in the period 07.2014 - 10.2022 382 patients underwent POEM for achalasia. The number of patients over 60 years was 89, with mean age - 68.2 years (60-84). Diagnosis was confirmed on high-resolution manometry, endoscopic and X-ray methods of investigation. All patients were further examined in the standard volume.

Results: The mean duration of surgery - 88.8 minutes. One patient after operation had clinical symptoms of reflux esophagitis, which were cured after the appointment of PPI. Two patients with sigmoid achalasia had a relapse of complaints in 10 and 11 months after operation. POEM was performed again. There are no symptoms for 6 months, dynamic monitoring continues. Endoscopic control is performed on 3, 6 and 12 months after the surgery. In all patients, except for 2 of the above cases, complications or relapse of the disease are not noted. Among the chronic diseases in patients, hypertension and diabetes prevailed, for this diseases patients received appropriate therapy prescribed by specialists. None of the clinical observations showed the development of complications associated with chronic diseases. The average number days at hospital was 2.91.

Conclusions: Results are comparable with group of patients younger 60 years. The patient's age and somatic status do not effect on the duration or technical features of surgery. POEM has shown effectiveness in a group of patients older 60 years and can be useable as the main method of treatment in such clinical situations

Keywords: POEM achalasia

Society of Gastrointestinal Intervention

Society of Gastrointestinal Intervention

Norzyme is the most effective recommended digestive enzyme for the PEI & dysfunction Patients.

Norzyme has been published in 3rd edition of Hepato-Biliary-Pancreatic Surgery's text book.

Norzyme® cap. 10000

[composition]
pancreatin enteric coated microtablet 162.7mg

[dosage]
take 2~4 capsules three times a day

Norzyme® cap. 25000

[composition]
pancreatin enteric coated microtablet 457.7mg

[dosage]
take 1~2 capsules three times a day

Norzyme cap. 40000

[composition]
pancreatin enteric coated pellet 440mg

[dosage]
take 1 capsules three times a day

Pharmbio Korea Inc.
Customer Service : +82-2-587-2551 / www.pharmbio.co.kr

Manufacturer
Nordmark Arzneimittel Gmbh & Co. KG
25436 Uetersen Germany

YUHAN

FOR YOUR BETTER LIFE

젬시빈®

젬시타빈 200 mg/바이알, 1 g/바이알

젬시빈® Product Information.

[제품명] 젬시빈주200 mg, 젬시빈주1 g **[원료 약품 및 분량]** 1 바이알 중 젬시타빈염산염(USP) 228 mg **[효능효과]** 1. 비소세포폐암 2. 췌장암 3. 방광암 4. 유방암 5. 난소암 6. 담도암 **[용법용량]** 각 효능효과에 맞게 투여한다. 1. 1.)병용요법 젬시타빈과 시스플라틴을 병용 2) 단독요법 젬시타빈 1,000 mg/m² 으로 30분에 걸쳐 정맥내 주입으로 투여한다. 3주동안 1주일에 1회 반복 투여하며 그 다음 1주는 휴약한다. 2. 젬시타빈 1,000 mg/m² 으로 30분에 걸쳐 정맥내 주입하되, 연속 7주 동안 주 1회씩 투여한 후, 다음 1주일은 휴약한다. 이 후 주기에는 연속 3주 동안 주1회씩 투여한 후 다음 1주는 휴약한다. 3. 시스플라틴과 병행하여 치료하는 경우 젬시타빈의 권장용량은 1,000 mg/m² 으로 28일 주기에서 1일, 8일, 15일째에 30분에 걸쳐 정맥내 주입하고 다음 1주일은 쉰다. 4. 각 21일 주기에서 1일, 8일째에 젬시타빈(1,250 mg/m²)을 30분간 정맥내 주입으로 투여한다. 5. 각 21일 주기에서 제1일, 8일째에 젬시타빈 1,000 mg/m² 을 30분 이상 정맥주사로 투여한다. 카보플라틴은 제1일에 이 약을 투여한 후 정맥 주사로 투여한다. 6. 시스플라틴과 병행하여 치료하는 경우, 이 약의 권장 용량은 1,000 mg/m² 으로 21일 주기에서 1일, 8일째 30분간 정맥내 주입으로 투여하고, 매 주기 제 1일, 8일의 이 약 투여는 시스플라틴 투여 후에 시작한다. 시스플라틴은 1일, 8일째 정맥내 주입하여 투여한다. **[사용상의 주의사항]** 1. 경고 1) 투여 시간의 연장과 투여 횟수의 증가에 따라 독성이 증가된다. 2) 골수 기능 억제를 초래하여 그 결과로 빈혈, 백혈구감소증, 혈소판감소증을 유발할 수 있다. 고도의 골수 억제가 있는 환자에는 투여하지 않는다. 2. 다음 환자에는 투여하지 말 것 1)이 약 또는 이 약의 구성성분에 과민반응 환자 2) 중증 신부전 환자에게 이 약과 시스플라틴의 병용은 금기 **[저장방법]** 밀봉용기 15~30℃ 보관 **[개정년월일]** 2019-09-21

※ 자세한 허가사항은 식약처 의약품통합정보시스템 홈페이지(https://nedrug.mfds.go.kr/)를 참고하여 주시기 바랍니다. 요약 허가사항에 반영되지 않은 허가 변경이 상기일자 이후에 있을 수도 있습니다.

KR-GGB-2200001

YUHAN | 서울특별시 동작구 노량진로 74, 유한양행 www.yuhan.co.kr | TEL 080-024-1188

Otsuka
한국오츠카제약
Under license of Otsuka Pharmaceutical Co., Ltd.

The Lasting Value of the Original

오리지널의 가치를 담은 한 알

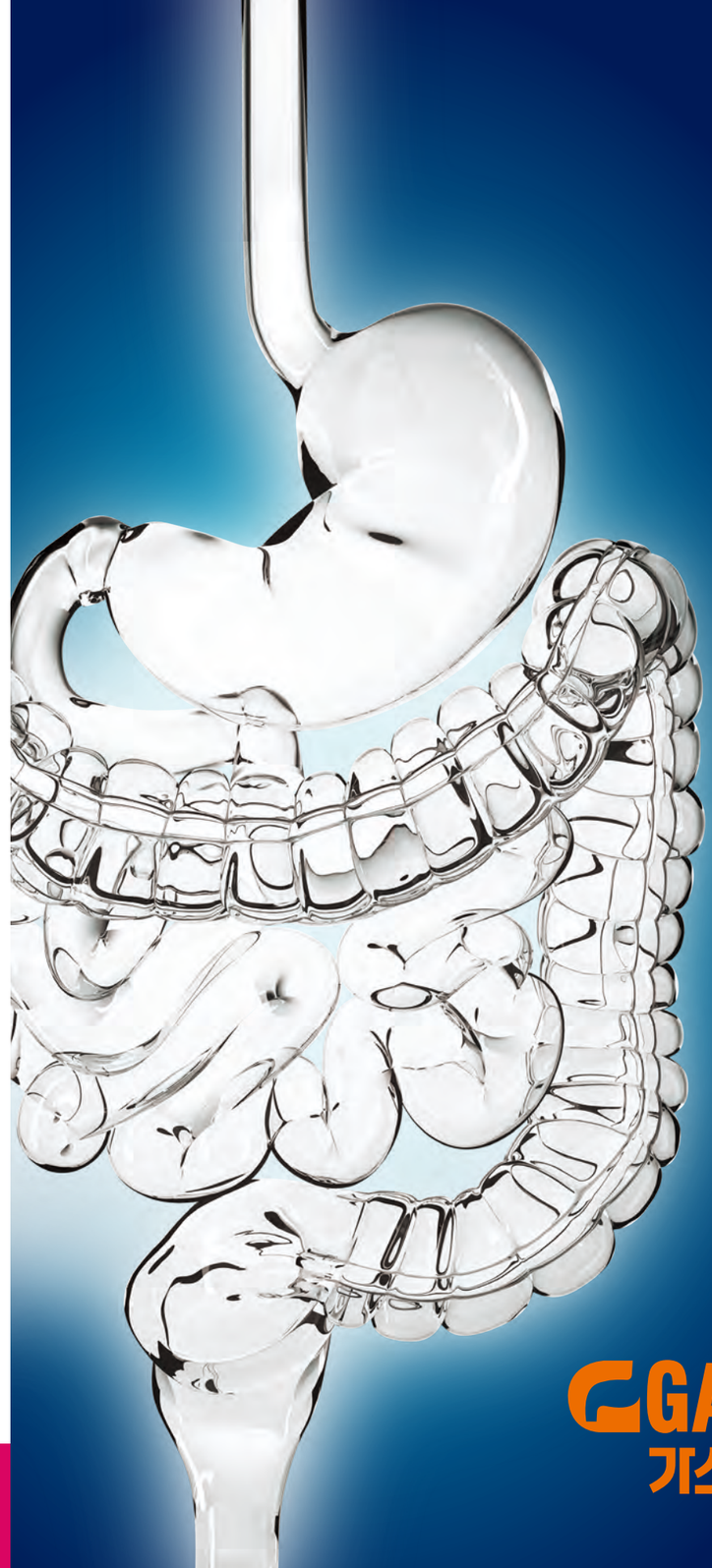
신속하고 지속적인 약물방출이 가능한
국내 유일의 이층정 구조의 레바미피드 서방정

MCT-21-010 | 20210716 approved

무코스타® 150mg 서방정
[레바미피드]

[효능 · 효과] 다음 질환의 위점막병변(미란, 출혈, 발적, 부종)의 개선 : 급성위염, 만성위염의 급성악화기
[용법 · 용량] 성인 : 레바미피드로서 1회 1정(150 mg)을 1일 2회(아침, 저녁) 경구투여한다. 이 약은 공복 상태에서 복용한다.
이 약은 서방정이므로 분쇄하거나 분할 또는 씹지 않고 전체를 복용한다.

대웅제약



1회 복용
Once a Day

From upper GI
to lower GI
For total GI management

GASMOTIN® SR Tab
가스모틴® SR정 Mosapride citrate 15mg

Society of Gastrointestinal Intervention

SGI 2023

The 16th Annual Meeting of Society of Gastrointestinal Intervention

13 Fri -14 Sat, October
Grand Hyatt Incheon, Korea

The Society of Gastrointestinal Intervention